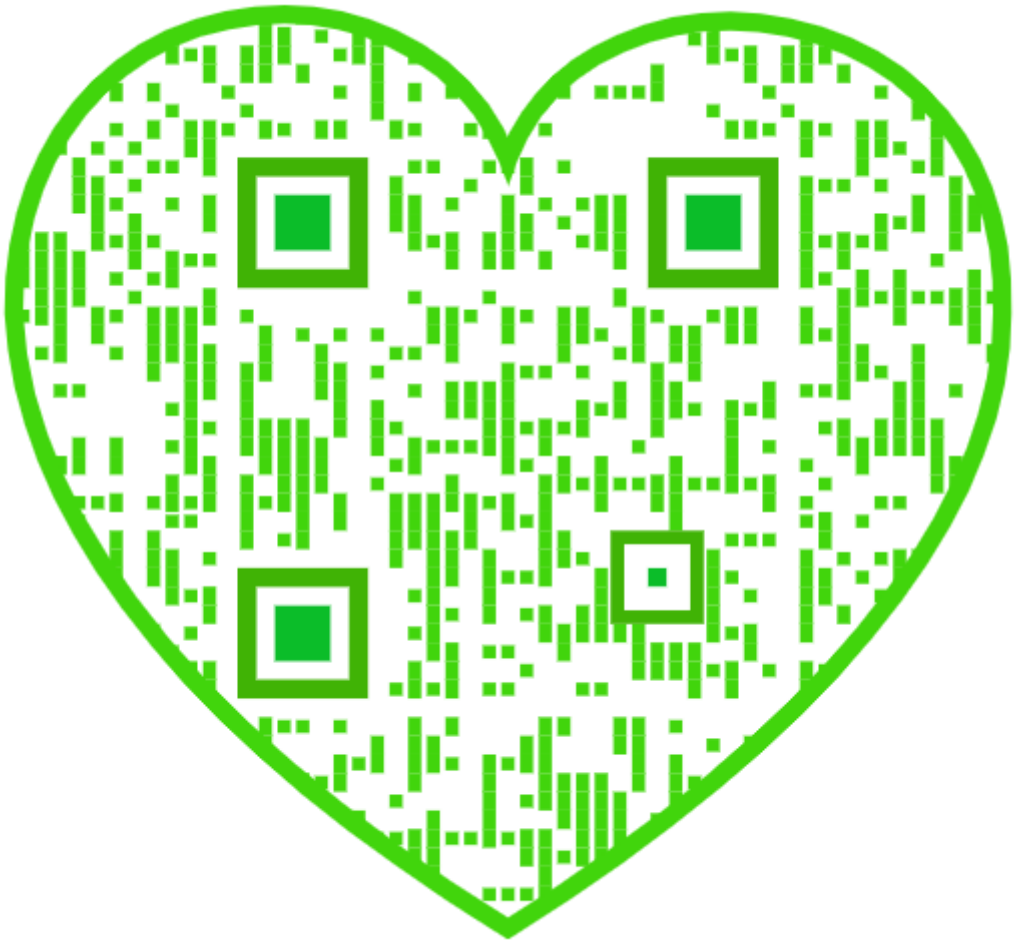
DISEASES OF SWINE

ROBERT A. CRAIG, D.V.M.



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DISEASES OF SWINE

WITH SPECIAL REFERENCE TO THE PREVENTIVE MEASURES OF DISEASE

BY

ROBERT A. CRAIG, D.V.M.

Professor of Veterinary Science and Experiment Station Veterinarian, Purdue University, Lafayette, Ind.

ILLUSTRATED

ORANGE JUDD COMPANY
NEW YORK
1906

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PREFACE

THE literature bearing on diseases of hogs is very scattering, and it is believed that a short treatise on this subject will be of use to stockmen and veterinarians. There is a special need for a work of this kind —made known by the many inquiries received by the veterinarians from the swine breeders over the country, and in other ways. Not long ago the Purdee University Agricultural Experiment Station issued a bulletin on swine diseases that proved one of the most popular bulletins ever issued by this Station.

In no other class of farm animals is so little attention given the preventive measures of disease, and, as a result, the per cent. of loss is about twice as great as it is in other species. In discussing the different diseases, the causes and preventive measures are given special attention by the writer.

There is a certain class of readers that believe it unnecessary to learn the correct name of a disease, or use the correct term in speaking of a diseased process. However, such technical terms have come into more general use during the last few years, and the average reader is familiar with the ones commonly used. In the different discussions the use of technical terms is avoided as far as deemed best, and an effort is made to avoid complicated and long discussions because of the difficulty in understanding them.

R. A. CRAIG.

PURDUE UNIVERSITY,
March 31, 1906.

PART I

DISEASES OF SWINE

GENERAL DISEASES

DIAGNOSIS OR RECOGNITION OF DISEASE

THE diagnosis is based on a careful observation of the symptoms or evidences of disease. This is not as difficult in swine as it is in some of the other farm animals, but unless we are acquainted with the behavior and habits of swine and possess a knowledge of the normal function and appearance of the different organs of the body, we cannot expect to recognize disease. This is very essential, for without it we are unable to recognize the true nature of the diseased process, and cannot use an intelligent line of treatment. Stockmen have plenty of opportunity to gain this knowledge by practical experience and careful observation.

The general symptoms of disease are those affecting the entire system. They inform us as to the condition of the animal at the outset and during the progress of the disease. Thus we have the symptoms connected with the (*a*) pulse, (*b*) respirations, (*c*) body temperature, (*d*) visible mucous membranes, (*e*) surface of the body, (*f*) secretions and excretions, and (*g*) nervous system.

The number of respirations per minute will vary in a healthy animal, and are frequently accompanied by respiratory sounds, as grunting, etc. During rest they vary from ten to twenty per minute; if warm or excited and during exercise, from sixty to one hundred.

In disease the respiration may be quickened, labored, and noisy. In pleurisy the walls of the chest are held more or less rigid, and the abdominal walls are used in breathing. This is called the abdominal form of respiration. In the thoracic form, which occurs in an inflammation of the lining membrane of the abdomen, the abdominal walls are held rigid and the movement of the chest walls is increased. In thumps a sudden contraction of the flanks occurs.

In the different diseases of the air passages and lungs the altered sounds and movements of the respiratory muscles are of great importance, both in the recognition of the different diseases and in noting their progress. The secretions from the lining membranes are also increased and modified. When the air passages are irritated by dust and lung worms, sneezing and coughing occur. The different lung sounds, nasal secretions, etc., will be discussed in connection with the different respiratory diseases.

The body temperature, as in all farm animals, is taken in the rectum, the ordinary fever thermometer being used. The normal temperature of a hog varies from 100.5° to 105°. The average is about 103°. The variation in the body temperature in health is due to the following conditions: exercise and warm

quarters will raise it, while cold quarters and drinking cold water has the opposite effect.

In disease there may be from one to four degrees of fever. In some disorders the body temperature is below the normal.

The visible mucous membranes are those lining the mouth, nose, and eyelids. They may become changed in appearance in acute and chronic forms of disease.

In health the visible mucous membranes are a pale reddish color and appear moist. Their color, however, will vary, and may become a deep red during exercise. The following changes may be noted in disease: when inflamed and in feverish conditions, a bright red; in collapse, internal hemorrhage, and impoverished or bloodless conditions of the body, pale; in the beginning of a fever, dry, but in later stages, excessively moist. The mucous membrane lining the mouth may become coated and soapy, like in digestive diseases. In hog cholera and other serious febrile diseases, secretions may accumulate around the margins of the eyelids and the eyes appear dull.

The skin of a healthy hog feels mellow and soft, and the *coat* appears heavy, smooth, and glossy. However, the skin and coat of a healthy animal are subject to a great deal of variation because of the surroundings and care. When the coat is thin, irritation from the sun and dirt may greatly change the appearance of the skin. An inelastic, hard, rigid, scurvy skin, and a dry, thin, rough, harsh coat indicate an unthrifty, unhealthy condition.

The character of the body *excretions and secre-*

tions will be discussed in connection with the symptoms of the different diseases. These become greatly changed in some cases, and are important symptoms of disease.

The condition of *the nervous system* is indicated by dulness, excitability, or delirium. The hog may stagger, walk stiffly, drop the head, turn the head to one side, walk in a circle, have convulsions, and show a paralysis of a part or the whole body, as a result of a diseased condition of some part of the nervous system.

ADMINISTRATION OF MEDICINE

The different methods of giving medicine are as follows: (*a*) by way of the mouth, (*b*) by injecting into the tissues beneath the skin, (*c*) by rubbing into the skin, (*d*) by the air passages and lungs, and (*e*) by the rectum.

By way of the mouth is the most common method of dosing hogs. Medicine can be given in the *feed* or as a *drench*. Because of the comparative simple digestive tract, drugs enter the system quickly and act in a short time when either of these methods is used.

If the hog is not too sick to eat and the drug does not have an unpleasant taste, it can be given in the feed. If soluble, milk or thin slop can be used, and if insoluble, ground feed is to be preferred. When a large number of swine are to be dosed, they should be separated into small bunches and each bunch dosed separately. In all cases when the dose

is large or poisonous drugs used, the medicine must be well mixed with the feed. If this is practiced, there is more certainty of each animal getting the proper dose and the danger from over-dosing is avoided. In young pigs we can take advantage of the fact that some drugs are excreted in the milk, and administer them to the mother.

Drenching a hog is not difficult if the animal is easy to manage and we go about it quietly. The quickest and easiest way to drench a drove of hogs is to drive them into a small pen, where they have but little room to move about. To hold the animal while drenching it, a noose of sash cord or quarter-inch rope can be placed around the upper jaw well back toward the angles of the lips, and the medicine thrown into the back part of the mouth with a dose syringe. As there is danger of the hog breaking the syringe, it is best to use a metal one. Sometimes when the drench is bulky and the hog hard to hold, it is necessary to elevate the head and raise the fore feet off the ground. For this purpose a pulley and rope wire stretcher is recommended. It should be hung in the most convenient part of the pen, and the animal secured in the usual way by placing a noose around the jaw. The end of the rope is thrown over the hook in the lower pulley and the hog drawn up until it is almost off the floor. It is best to wait until the hog has become quiet and well under control before giving it the drench, as there is some danger of the medicine getting into the air passages and doing harm. If there is any chance for the hogs that

have been dosed to become mixed with the others, they should be marked with paint in order to avoid mistakes.

Soluble drugs are best given in a milk or water drench, insoluble ones in syrup or oil. Instead of a syringe, a long-necked bottle, or a funnel with rubber tubing and an iron nozzle, can be used. However, it is not advisable to use a bottle, as there is danger of the hog breaking it and cutting his mouth on the glass.

Non-irritating drugs can be *injected into the tissues beneath the skin.* This method of giving drugs is suitable when the dose is small, and prompt, energetic results required. The active principal or alkaloid of the drug is generally used.

The point of injection should be where the skin is thin, as the flank, belly, inside of the thigh, etc. In fat hogs a part where there is but little fatty tissue should be chosen or the injection made direct into the muscular tissue, otherwise it will not be absorbed promptly. The needle and hypodermic syringe must be clean, and the skin cleaned with a disinfectant before passing a needle through it, in order to prevent infection and abscess formation.

Giving medicine by way of *the air passages and lungs* is but little used in hogs. Drugs in the form of medicated steam or vapors are sometimes used for their local effect on the air passages. Veterinarians seldom attempt to anesthetize a hog, especially if fat, as it is too difficult and very apt to kill the animal.

Drugs suitable for the purpose of inhalation are

turpentine, creolin, tar disinfectants, sulphur, etc. Turpentine is the one most used, and is easily disseminated by pouring on boiling water or on hot bricks. It is necessary to put the hogs into a tight enclosure, or they will get but little benefit from the vapors. However, care must be taken or the animals may suffer from the lack of air.

Drugs given *by way of the rectum* in the form of an injection, enema or clyster, are used for their local effect on the intestine and to accelerate the action of a purgative.

It is best to use some form of a fountain syringe in giving a rectal injection. About two feet of rubber tubing carrying a funnel at one end will answer the purpose very well. In giving an injection, the feces should be first removed from the rectum and the nozzle of the syringe smeared with vaseline before introducing it. From two to four quarts of water may be slowly injected into the intestines of a grown hog. When giving a large injection, it is best to elevate the hind parts, so as to help the water to gravitate forward along the canal.

DISEASES OF THE DIGESTIVE ORGANS

SIMPLE INFLAMMATION OF THE MOUTH—STOMATITIS

Simple sore mouth in hogs is no doubt more common than we are aware of, as a large per cent. of the cases do not show marked symptoms and escape notice.

Causes.—Among the common causes of this disease can be mentioned putrid or decomposed slops, and water from foul wallows, especially that containing seepage from hog lots and manure heaps. Such fluids contain a large number of injurious germs which may irritate the lining membrane of the mouth, and if the hog is unthrifty, or the mucous membrane abraded, are very apt to produce disease.

Wounds and irritation, caused by awns and beards of barley and wheat in the feed and the rope loops used in catching hogs, may be the direct or indirect causes of the parts becoming inflamed. Small inflamed patches are frequently seen on the inside of the lips, cheeks, and other parts of the mouth in such diseases as hog cholera, swine plague, anthrax, and actinomycosis.

Symptoms.—At the beginning of the inflammation the mucous membrane lining the mouth is hot, dry, and red. This stage of the disease is so short that it

is often overlooked, and, usually, it is not until the stage of secretion begins that the inflammation is noticed. When this occurs, saliva is seen dribbling from the mouth and hanging in ropes from the lips. The hog shows a disposition to eat sparingly, or refuses to eat at all, mastication is painful, and the mouth has a bad odor.

The animal will champ the jaws at times, and seems to find relief in running the snout into water. Slops and soft foods are preferred, and if corn is taken into the mouth, the animal is unable to chew it and a large part will drop out. Mild cases do not show marked symptoms, and only a slight or local soreness is noticed.

Simple sore mouth is not a serious disease and recovery usually occurs within a few days, even when little or no treatment is used.

Treatment.—Preventive measures are important. Hogs should not be fed grains containing awns, and when catching hogs with a loop we should be careful and not bruise the mouth. Hot and putrid foods and irritating drenches should not be given, not because of their irritating effect on the mouth alone, but because of the injurious effect they have on other parts of the digestive system.

To relieve the pain and help in keeping the mouth clean, plenty of clean water should be placed where the hog can run his snout into it. Hard, dry foods should be withheld and the animal fed nothing but sloppy feeds.

The medicinal treatment consists in washing the

mouth twice a day with an astringent or antiseptic wash. A four per cent. water solution of boric acid or alum can be used. These washes are especially advisable in young pigs. A one or two per cent. water solution of some of the tar disinfectants is best in cases that have a disagreeable odor and sloughing of the mucous membrane. The treatment should be kept up until the inflammation subsides and the hog begins to eat.

DEPRAVED APPETITE

Depraved appetite is not a very common or important disease of hogs. It generally occurs as a symptom of some other disease, but may occur as a result of feeding a faulty ration (one deficient in alkaline or earthy salts), lack of exercise, digestive disorders, and a nervous condition. It is frequently noticed at the beginning of a hog cholera outbreak.

Symptons.—Hogs do not thrive as they should when affected by this disease, and they may become very thin and out of condition. An inclination to eat all sorts of indigestible substances, such as earth, sand, feces, bristles, rotten wood, etc., is shown. Sometimes the animals become very nervous and quarrelsome, and attack one of their number and kill it. When affected by this disease, some sows eat their young pigs.

Treatment.—This is chiefly preventive, and consists in adding to the ration whatever elements it is deficient in. When occurring as a symptom of some other disease, the primary disease should be treated.

The feeding of charcoal, salt, wood ashes, etc., may supply the elements needed by the system and relieve the condition. When a sow forms the habit of eating her pigs, she should not be used for breeding purposes.

ACUTE INDIGESTION—ACUTE GASTRITIS

Acute indigestion is not an uncommon disease of hogs. It frequently occurs in swill-fed and fattening hogs.

Causes.—The common causes of irritation to the stomach are overloading and eating spoiled foods, especially putrid swills. Alkaline washing powders and soaps in the swill, and the feeding of hog cholera medicine as a preventive for hog cholera, may irritate and inflame the stomach. Poor care and exposure may also cause it.

Symptoms.—The hog usually goes off by itself and lies down in some quiet place, or stands with the back arched and abdomen tense. Vomiting sometimes occurs early in the attack. The animal is dull and feverish, and is usually found lying down in the litter around straw stacks and manure heaps, or in the long grass and weeds. When disturbed, it will grunt and show other evidence of abdominal pain.

In severe cases the animal is quite feverish, and if the intestines are irritated a diarrhœa occurs. This is a frequent complication.

When vomiting occurs early in the attack the irritating material is gotten rid of, and the course of the disease is shortened. In most cases recovery

does not occur for several days, and it may end in the chronic form.

Treatment.—Decomposed and irritating foods should not be fed. We should also practice care when irritating drugs are given in the feed and as a drench, as their careless use may irritate the stomach.

It is always desirable to induce vomiting as soon as possible by giving an emetic. Ipecacuanha is a very useful emetic. The dose is twenty or thirty grains in a little warm water. This should be followed by a physic of linseed oil (two or three ounces). If the weather is disagreeable, the hog should be given comfortable quarters, and when it begins to eat, fed a light, sloppy diet for a few days.

CHRONIC INDIGESTION—CHRONIC GASTRITIS

Causes.—When the causes of acute indigestion act for some time, either in an intermittent or continuous manner, it may result in the indigestion becoming chronic. Weakness or debility hinders digestion of the food in the stomach, and is a common predisposing cause. Other causes are intestinal worms and innutritious food.

Symptoms.—In the beginning the symptoms are usually the same as in the acute form of the disease. Hogs become unthrifty, and pigs grow slowly and become badly stunted. The animal is constipated, or constipation and diarrhœa may alternate. Colicky attacks occur at times, manifested by restlessness and other symptoms of abdominal pain.

This disease may persist for a long time, and the hog becomes badly stunted.

Treatment.—Preventive measures along the same line as in acute indigestion are indicated. If the ration is at fault it should be changed, and if intestinal parasites are the cause of the disease, they should be gotten rid of in the usual way.

Clean quarters and a well-balanced, easily digested ration should be provided. The hog should be given access to plenty of common salt and charcoal. In most cases it is best to give a tonic in order to increase the activity of the digestive organs. The following is a useful tonic mixture, and can be given in teaspoonful doses in the feed twice a day: bicarbonate of soda (three ounces), powdered gentian (three drams), sulphate of soda (three ounces). Any of the bitter and saline tonics are useful in helping to relieve this condition. To check the diarrhœa, nitrate of bismuth can be given in half-dram or dram doses. If the animal is constipated, a physic of calomel (ten to twenty grains) or castor oil should be given.

INFLAMMATION OF THE STOMACH AND INTESTINES—GASTRO-ENTERITIS

Inflammation of the stomach cannot be distinguished by the symptoms shown from that of the intestines and vice versa. Frequently both are inflamed at the same time. It is, therefore, more convenient to discuss both under the one head.

Causes.—This disease is largely due to filthy sur-

roundings and irritating feeds. Some people seem to think that a hog can eat anything and take poison with impunity, and, as a result, it frequently suffers from ignorant methods in the feeding, care, and giving of drugs.

The cause of inflammation of the stomach and intestines are much the same as in acute indigestion, only they act more intensely. Dirty, filthy yards and pens, and decomposed, overkept foods can be especially mentioned. When hogs are kept under such conditions the snout and food becomes soiled with filth and injurious organisms. These enter the digestive tract and irritate the lining membrane, causing it to become inflamed, and paving the way for certain bacteria that would under other conditions prove harmless.

Toxic or poisonous substances, as salt brine, washing powders, wash waters, etc., that are frequently found in the swill, may cause a severe inflammation of the stomach and intestines.

Symptoms.—The first symptoms usually noticed are those of severe abdominal pain. The back is arched, the ears droop, and the abdomen is tucked up. When the abdominal walls are pressed on the hog will flinch and show other evidence of pain, such as grunting, squealing, restlessness, champing and grinding of the teeth. The body temperature is higher than normal, especially at the beginning of the disease. If the intestinal contents ferment or obstruct the intestines, bloating occurs. The inflammation causes the animal to suffer severely at first, and

have an intense thirst. The intestines are constipated at this stage of the disease, later a diarrhœa is present. When the stomach is involved, vomiting is one of the prominent symptoms.

The hog finally becomes very weak, and is generally seen lying down in a bed that it has rooted for itself in the litter. There is no rule as to the duration of the disease. It may last for a short time or continue for a week or more.

Lesions.—The mucous membrane lining the stomach and intestines is thickened and inflamed. If the inflammatory changes have been going on for some time, small pouch-like ulcers (follicular) may be seen scattered over the mucous surface. The mesenteric lymphatic glands are also red and inflamed.

In severe cases the entire wall of the small intestine and the peritoneum may take part in the inflammation. The contents of the intestines are mucous and flaky, sometimes mixed with blood.

Treatment.—The preventive treatment consists in bettering the hygenic conditions in the hog lot, and avoiding poisonous and irritating slops. The same measures of prevention recommended in acute and chronic indigestion are indicated in this disease.

The hog should be given clean, comfortable quarters. If vomiting has not occurred early in the attack, the offensive material should be gotten rid of by giving an emetic of ipecacuanha (twenty or thirty grains in a little water). Sulphate of zinc (ten to fifteen grains), can be used in the same way as the ipecacuanha, and is a useful emetic in hogs. This can

be followed by a physic of calomel (ten to thirty grains), or castor oil. To relieve the pain, a teaspoonful of tincture of opium in about the same quantity of linseed oil can be given, and repeated, if necessary, every three or four hours until relieved. In addition to the physic, rectal injections of warm, soapy water may be necessary. When diarrhœa occurs, it should be treated promptly. Nitrate of bismuth in half-dram doses, three times daily, supplimented in bad cases by tincture of opium, will usually check it.

As a counter-irritant, oil of turpentine can be applied to the walls of the abdomen and covered up until the skin is irritated and reddened.

The best diet for the animal is thin, well-cooked gruel. This should be fed until the hog is able to digest heavier food.

POISONING

Meat brine and washing powders are the most common causes of poisoning in hogs. There are a number of other irritating and poisonous substances and drugs that sometimes find their way into the food and are eaten by hogs. A few of the more important poisons will be discussed under their separate heads. No great loss from this source occurs.

Poisoning from Meat Brine.—Brine from meat barrels and fish kegs is sometimes emptied into the swill, or in some place where the hogs can get to it. When eaten, it causes an intense inflammation of the stomach and intestines. Hogs do not eat too much

or too freely of salt if they have access to it at all times, but the meaty taste of the brine or some other peculiarity adds to their desire for it.

The symptoms come on soon after the hog has eaten the brine. The hog is restless at first, and runs from one place to another, lies down and gets up again, stamps the feet and squeals. Convulsions occur, during which the hog throws itself around violently and froths at the mouth. The pain is severe. As death approaches, the intervals between the convulsions become shorter. Vomiting is a common symptom. In the latter stages a marked stupor comes on, and the hind parts are usually paralyzed. If the hog lives a few days, a watery diarrhœa occurs.

The treatment consists in giving an emetic as early in the attack as possible. If this is done promptly, and the hog gets rid of the poison by vomiting, the animal will be but little inconvenienced. Ten or fifteen grains of sulphate of zinc in a little warm water is a very useful emetic. Plenty of drinking water should be allowed, and to relieve the irritation to the stomach and intestines, oils or flaxseed tea should be given. Stimulants are indicated if the hog acts stupid. To quiet the pain, a teaspoonful of tincture of opium may be given at short intervals.

Poisoning from Washing Powders.—Poisoning from washing powders occurs when wash waters are emptied in with the kitchen slops.

The symptoms are dulness, loss of appetite, moderate high temperature, tenderness on pressing the ab-

dominal walls with the hands, diarrhœa, vomiting, lameness, nervous disturbances, and a partial paralysis. In some cases the symptoms and course of the disease resemble that of "hog cholera."

The treatment is mostly preventive, and consists in avoiding the feeding of slops containing washing powders. If this form of poisoning is suspected or recognized, vinegar should be given in the early part of the attack, in order to neutralize the alkaline substances.

Poisoning from Feeding Cottonseed.—Fatal results may follow the feeding of cottonseed to hogs, whether given ground, boiled, or as droppings from cattle. However, poisoning is less apt to occur under the latter condition than in any other way.

The evil effects of the cottonseed may not be noticed for several weeks after the hogs have begun eating it. The symptoms are as follows: Dulness, staggering gait, labored breathing, spasmodic in character, and usually called "thumps," loss of sight, restlessness, walking in a circle, running into obstructions, lying down on the belly, and, finally, sudden exhaustion and death. In the majority of cases the hogs are found dead in their beds, or in the yard, ten or twelve hours after they have apparently been in the best of health.

The only treatment that can be recommended is preventive, and consists in avoiding cottonseed as a feed for hogs for more than two weeks at a time, unless it is in the droppings from cattle.

Poisoning from Eating Ergot.—Hogs may be

poisoned by eating screenings from the thresher or elevator that contain ergot. It may possibly be produced on pasture, particularly rye pasture, in years favorable for the growth of this fungus. Ergot grows mostly on the heads of rye, especially wild rye.

The symptoms are a stiff, lame gait, like in rheumatism, swollen, tender joints and feet, and gangrene of different parts of the body. The extremities, especially the tail and ears, lose their natural warmth and vitality, and deep red spots that become black and dead looking form on the skin. A part of the ears and tail finally cracks and drops off, and the gangrenous tissue in other parts of the body separates from the healthy part and drops out. The mouth may also appear sore, the eyes swollen, and the appetite interfered with.

The treatment consists in examining into the character of the ration as soon as the symptoms manifest themselves, and cut off that portion containing the ergot. Hogs affected by ergot poisoning during the cold weather should be given warm quarters, as this prevents to some extent the sloughing of the extremities. Iodide of potassium can be given in ten or fifteen grain doses in the slop twice a day.

EFFECT OF EATING WHEAT AND BARLEY BEARDS

Hogs sometimes die when turned on wheat and barley stubble, and around straw stacks. In some cases the disease is a severe sore mouth, in others it

is a general intestinal disturbance, or sore throat accompanied by loud and difficult breathing. The symptoms vary a great deal in this disease.

Lesions.—On examining the hog after death the beards are found in the mouth, stomach, throat, and larnyx. The beards penetrate the lining membranes of these organs, irritating and inflaming them. Sometimes they form a roll or ball, and work down beside the tongue, usually toward its base, or they may pass on and become lodged in the air passages and stomach. The character of the inflammation depends largely on the length of time the beards have been lodged in the part.

Treatment.—When possible, the beards lodged in the mouth and throat should be removed. If in the air passages and stomach, they cannot be removed and the animal will die of suffocation or an inflammation of the parts. After removing the irritation from the mouth, the hog should be given treatment for sore mouth.

DIARRHŒA IN YOUNG PIGS—SCOURS

Causes.—Scours in pigs is frequently caused within the first few days after birth by the feverish condition of the mother affecting the character of the milk. Fermentive foods, slops, moldy corn, etc., when fed to the mother, may cause her to give poisonous or toxic milk. Chilly, damp weather, getting out in the wet grass when too young, bringing the pigs up by hand, or with another sow, are frequent causes. Young pigs, when kept in damp, dark, dirty pens

are more apt to have scours than when kept in clean pens and allowed plenty of exercise, pure air, and sunshine. Some outbreaks seem to be of an infectious character, as is the case in lambs and calves.

Symptoms.—The symptoms may set in so soon after birth that the pig is seemingly born with the affection. When the disease does not come on until the pig is a few days or a few weeks old, the scours are generally preceded by constipation.

The symptoms are fluid evacuations, grayish in color, and possessing a disagreeable odor. These become more watery as the disease progresses, and the tail and hind parts become soiled with the discharges. At the beginning the appetite may be good, but it is gradually lost, and the pig becomes dull and weak. The back is arched, the hair rough, and there is an indisposition to move about.

When the symptoms set in soon after birth the disease is more fatal, and a larger per cent. die than when the pigs are a week or so old.

Treatment.—As scours in pigs is a disease largely due to a faulty diet and unhygenic conditions, the preventive treatment is of more importance and gives better results than the medicinal.

At the time of farrowing the sow should be fed a light diet, and the pen kept clean and dry. The pigs should be allowed plenty of exercise, pure air, and sunshine. If the mother appears feverish, she should be given a physic of castor oil (two or three ounces). Sour swill and mouldy feed should not be fed.

To check the scours in the pigs, two or three tea-

spoonfuls of tincture of opium should be given the mother, or a few drops placed on the pigs' tongues. This should be repeated as often as necessary. In some cases the pigs should be given a physic in order to get rid of the irritation, but this part of the treatment is usually unnecessary.

DIARRHŒA—DYSENTERY

Diarrhœa is a common symptom of many diseases of the digestive tract. The immediate cause is an irritated condition of the mucous membrane lining the intestines and a profuse secretion from the intestinal glands.

Causes.—Among the common causes of diarrhœa can be mentioned irritating feeds, sudden changes in the feed, especially to green rye and corn, irritation from intestinal worms, imperfect mastication of the food, and its imperfect preparation for digestion, eating more food than the digestive organs can well digest, a debilitated condition, and irritation from undigested food.

Treatment.—The preventive treatment consists in avoiding such conditions as may cause the disease. When diarrhœa occurs as a symptom of some other ailment, this must first be treated, and the cause removed.

The hog should be given a light diet, or all food withheld for a short time, and the intestines relieved of the irritation by giving a physic of castor oil or calomel. This should be followed by tincture of opium (one to two teaspoonfuls), prepared chalk

(one-half to one tablespoonful), or nitrate of bismuth (one teaspoonful). When any one of these drugs is used the dose should be repeated as often as necessary, usually three times a day. The following preparation is very useful: bismuth subnitrate (one-quarter ounce), salol (one-quarter ounce), and bicarbonate of soda (one-half ounce); mix, and give a small teaspoonful in a milk drench three times a day. The animal should be kept quiet, and given comfortable quarters.

CONSTIPATION

Constipation consists in an undue retention of the feces, and their becoming hard and dry. It may precede a diarrhœa, because of the dry and inflamed condition of the intestines. It may also occur as a symptom of other intestinal diseases.

Symptoms.—The droppings are dry looking, and may be more or less covered with mucus. A prominent symptom is the straining attempts to defecate. The appetite is impaired, the hog acts dull and stands with the head down, or goes off by itself, hunts a quiet place, and lies down. Colicky pains are sometimes manifested. Eversion of the rectum may occur, especially if the animal has eaten freely of dry food.

Constipation occurring from other causes than a complication of disease seldom takes on a serious form.

Treatment.—When the animal becomes constipated, all dry food should be withheld, a sloppy diet fed, and plenty of drinking water allowed. In some

cases it is well to exercise the hog. A physic of castor or linseed oil should be given, but overdosing with physics should be avoided. The action of the oil should be assisted by rectal injection of warm soapy water. This line of treatment must be persisted in, until the constipated condition is relieved.

INFLAMMATION OF THE PERITONEUM—PERITONITIS

Causes.—This is not a common disease of hogs, as the lining membrane of the abdominal cavity is less succeptible to irritation from germs than that of most other animals. Peritonitis usually occurs as a result of an inflammation of the intestines, or womb, and is more often met with in the female than in the male, because of the difference in the development of the generative organs. Other causes are injuries to the abdominal walls and exposure to cold.

Symptoms.—As peritonitis does not usually occur as a distinct and separate disease, but secondarily, the symptoms are usually overshadowed by the original disease. The abdominal walls are held tense, the breathing is carried on mainly by the ribs, the pulse is quick and small, and the body temperature is higher than normal. The hog acts dull and depressed, refuses to eat, or eats but sparingly, and the abdominal pain may be severe. Diarrhœa sometimes occurs. When the inflammation is in the region of the urinary organs, urine is passed in small quantities and at frequent intervals. The animal moves slowly and takes

short steps, and shows a great deal of stiffness and soreness when moving about.

Peritonitis usually terminates in death. In some cases it takes on the chronic form. When this occurs the hog becomes very unthrifty and weak, and after a time may die. It is in mild cases only that recovery occurs.

Treatment.—The preventive precautions consist in

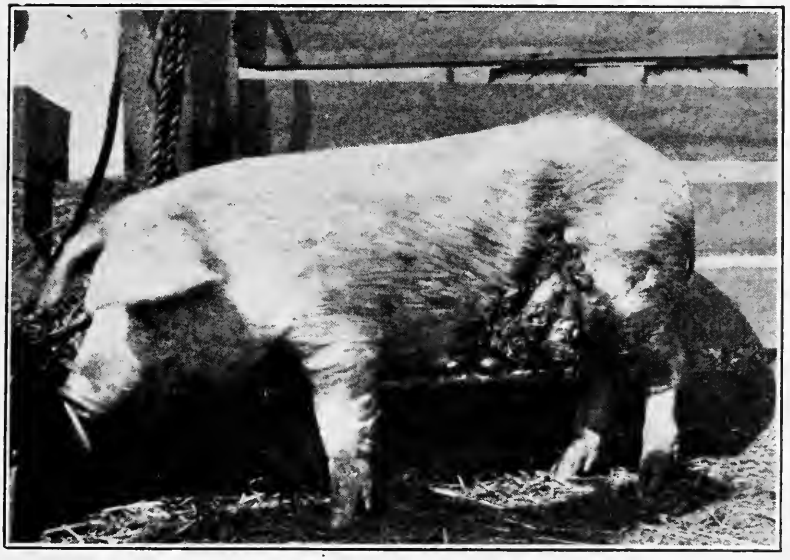


FIG. I—A BADLY CARED FOR WOUND IN THE ABDOMINAL WALL

observing strict antiseptic precautions and cleanliness in such operations as spaying and castrating, and when assisting in a difficult birth. Wounds in the region of the abdomen should be dressed daily with disinfectants and kept clean.

As early in the attack as possible a cathartic of Epsom salts (three or four ounces), or calomel (ten

to fifteen grains) should be given. To clean out the posterior bowel, rectal injections may be used. When hot water fomentations are applied to the abdominal walls, they should be kept up for several days. The pain can be relieved by giving tincture of opium in teaspoonful doses every three or four hours.

It is best to feed a sloppy, light diet, and give the animal comfortable quarters away from the herd.

DISEASES OF THE LIVER

JAUNDICE—YELLOWS

This is not a disease in itself, but rather a symptom of disease. It is difficult to recognize liver diseases in hogs, and quite impossible to differentiate one from another. For this reason, it is more convenient to discuss liver diseases under the head of jaundice.

Causes.—Gall-stones are occasionally found in hogs, and resemble fine sand in appearance. They may be found as large as peas. The cause of gall-stones are lack of exercise, overfeeding, concentration of the bile and its becoming infected by bacteria.

Liver flukes and intestinal worms may obstruct the bile duct as they pass along it. The former parasite is seldom the cause of liver diseases in this country, but the common round worm is a frequent cause of irritation and inflammation of the bile duct.

Inflammation of the bile duct may occur as a complication of indigestion or a catarrhal inflammation of the small intestine. The main causes, however, are overfeeding, lack of exercise, and decomposed foods.

Inflammation of the liver is frequently met with in germ diseases, and as a complication of indigestion. Certain micro-organisms entering the digestive tract along with the food and finding their way to the

liver may cause it to become inflamed. The character of the circulation in the gland is favorable for this sort of infection.

Symptoms.—Any condition raising the pressure in the bile ducts, or lowering the blood pressure in

FIG. 2—TAPEWORM OR HYDATED CYSTS IN THE LIVER TISSUE

the liver, may cause the bile to be taken up by the blood. When this occurs, the bile pigments are deposited in different parts of the body staining the tissues a yellowish color. This is quite noticeable in

the areolar tissue just beneath the skin and in the fat, a condition sometimes met with in apparently healthy hogs killed in the abattoir. A staining of the white of the eye, lining membrane of the eyelids, and the skin cannot be observed in hogs as readily as in some animals. When it does occur it is an important help in the diagnosis.

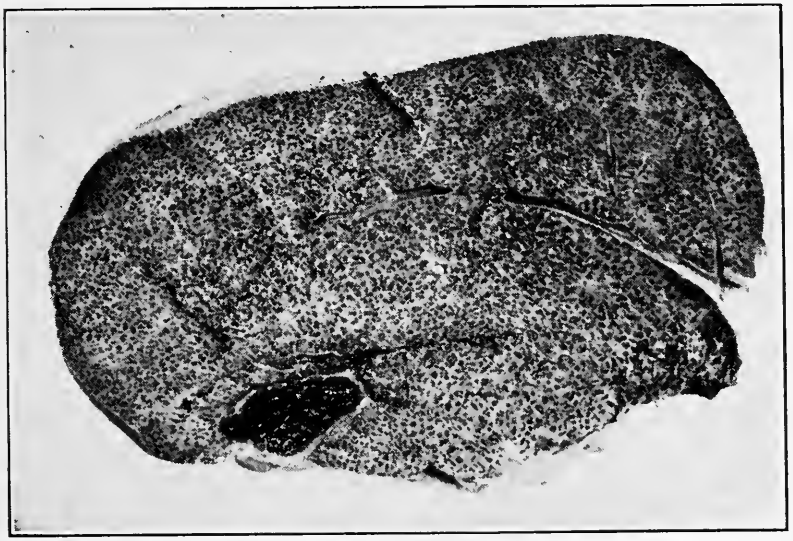


FIG. 3—A SECTION OF LIVER TISSUE PIGMENTED BY BILE

When the icteric condition occurs as a symptom or complication of another disease, the hog will also show symptoms of the original disease. These may be symptoms of acute or chronic indigestion, liver flukes, intestinal worms, gall-stones, etc.

The coloring matter from the bile may be present in the urine and greatly disturb the function of the kidneys. Constipation usually occurs, and the feces

have a more disagreeable odor than normal, because of the decomposition of the fats and other elements in the food. The animal usually acts dull and depressed.

Treatment.—When the jaundice occurs as a separate disease of the liver, and not as a complication, it may be relieved by giving the hog a chance to take exercise, and by feeding a light ration. It is also advisable to give a physic of Epsom salts, or calomel, and repeat the dose daily for a few days.

As jaundice is usually caused by indigestion, intestinal worms, etc., these causes must be removed before we can correct the disease.

DISEASES OF THE URINARY ORGANS

CONGESTION AND INFLAMMATION OF THE KIDNEYS

Causes.—Congestion and inflammation of the kidneys, as a result of an injury, is not uncommon in hogs. Blows and kicks in the region of the back, or injuries resulting from the drove piling up, are among the common causes. Exposure and wet, cold quarters, as in other domestic animals, are frequent causes, but such irritating drugs as turpentine and cantharides, when applied to the skin or given internally, are not as important causes.

Kidney diseases are commonly due to germs and their poisonous products, and these organs frequently become involved in blood poisoning and such infectious diseases as hog cholera and swine plague.

Symptoms.—The symptoms are so hidden that it is difficult to recognize the disease in the majority of cases.

The hog may show a disposition to lie down most of the time, and when it moves about the gait is apt to be stiff and straddling. Other symptoms of pain are sometimes manifested, and the appetite is usually irregular. The urine is passed in small quantities and at short intervals, is more highly colored than normal, and may be tinged with blood.

In well-developed cases the body temperature is

higher than normal, the respirations and pulse-beats are quickened, and the urine scant and highly colored. The hog's back may be sensitive to pressure, but this is not usually manifested. When the hog stands, the loins are arched and held stiffly, and the hind feet are placed well under the body.

In the latter stages of the disease, when the symptoms are severe, the urinary products accumulate in the system, and what is known as uremic poisoning occurs. Marked depression and convulsions are the symptoms seen in such cases.

Chronic inflammation of the kidneys may develop very slowly without giving rise to any noticeable symptom or symptoms, until the changes in the kidney structure become so advanced that they cannot perform their function, and death finally occurs from uremic poisoning, or heart-failure.

In the chronic form the symptoms are somewhat different from those of the acute. The urine is clear in color and secreted in large quantities. The hog is stupid, sluggish, and unthrifty, and finally becomes very weak. Faulty and weak heart action is also a prominent symptom.

Lesions.—The structural changes in the kidneys vary. They may be of the normal size, or much larger than normal. They may also appear pale, or deep red in color. Sometimes, they are marked with red spots, and the kidney capsule can be detached with great ease. On sectioning a kidney, a thick urine may be found in the pelvis and some fluid under the capsule.

In chronic cases of long standing the connective tissue may become greatly increased, and the kidney shrunken and small.

Tubercular lesions are sometimes found.

Very large cystic kidneys containing cavities filled with pus or urine are occasionally found.

Treatment.—The preventive measures consist in avoiding, if possible, such conditions as may cause the disease.

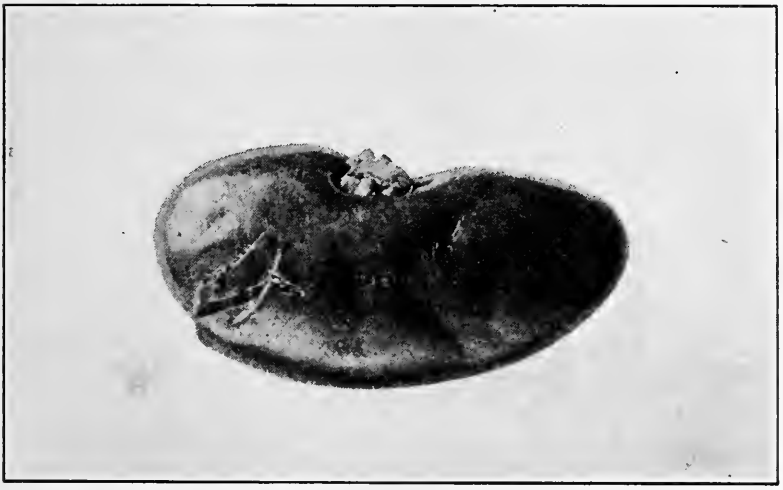


FIG. 4—A DISEASED KIDNEY SHOWING RED OR PETECHIAL SPOTS

The medicinal treatment consists in the use of hot applications to the back, just over the region of the kidneys, and the administration of small doses of castor oil daily. This is necessary in order to eliminate all of the waste products possible by way of the intestinal tract, and relieve, as much as possible, the work of the kidneys. It may be necessary in some cases to give heart tonics.

The best results come from a diet of sloppy, mucilaginous food, good care, and careful nursing. During convalescence bitter and saline tonics should be given, the same as recommended in indigestion.

INFLAMMATION OF THE BLADDER—CYSTITIS

Causes.—A common cause of inflammation of the bladder is the retention of the urine and its becoming infected with germs. Under such conditions the urine undergoes fermentive changes, ammonia is set free, and the lining membrane of the bladder becomes irritated and inflamed. Irritation from stone in the bladder (cystic calculus) may also cause it. Sometimes it occurs as a result of a severe inflammation in a neighboring part and its extending to the bladder. Drenching the animal with irritating drugs, such as turpentine, may irritate the bladder, as well as other parts of the urinary organs.

Symptoms.—The most prominent symptom is the passing of urine at frequent intervals and in small quantities. Because of the irritated condition of the nerves going to the part the penis may become erected in the boar. When the animal moves about, the soreness is shown by the stiff, straddling gait. The appetite may be poor, and the body temperature higher than normal. In severe cases the urine may contain clots of blood.

Unless the disease is neglected in the early stages and the inflammation is severe, recovery occurs in a few days.

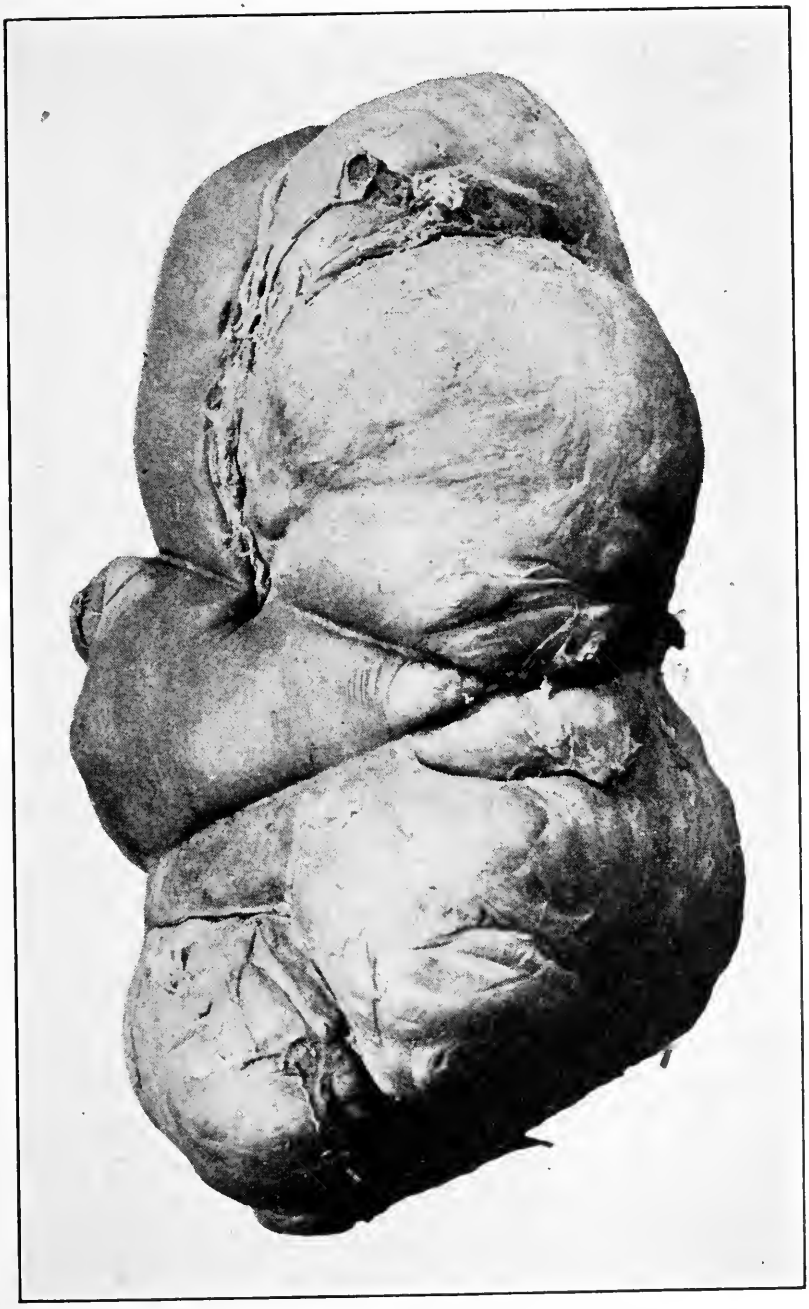


FIG. 5—A LARGE DISEASED KIDNEY

Treatment.—If the cause of the disease is known, it should be removed. Drugs that irritate the urinary organs should not be used carelessly. Retention of the urine should receive prompt attention and, if possible, relieved.

The medical treatment consists in drenching the animal with such drugs as have an antiseptic effect on the urine or prevent germs from developing in it. Chlorate of potassium can be given in from fifteen to thirty grain doses, or salol in from ten to fifteen grain doses, twice daily. A sloppy diet is indicated. Care should be taken that the hog does not suffer from exposure or become chilled when in this condition. In cases of long standing, bitter tonics should be given.

RETENTION OF THE URINE

Causes.—Retention of the urine may be due to a variety of conditions, such as a spasm of the neck of the bladder, paralysis, urethral and cystic calculi, (stones in the canal leading from the bladder and in this organ), injuries and inflammation of the urethra, inflammation and abscesses in the region of the sheath, and pressure on the urethra by tumors, etc.

Symptoms.—There may be an absolute retention of the urine, or it may come away from the over-distended bladder drop by drop. The animal makes unsuccessful efforts to urinate, and shows symptoms of abdominal pain. The hog is depressed and the appetite impaired. In case the cause of the retention cannot be removed and completely obstructs the pas-

sage of the urine, the symptoms soon assume a serious character, the bladder finally becoming so distended with urine that it is ruptured. Death occurs from peritonitis or uremic poisoning.

Treatment.—In spasm of the neck of the bladde the hog should be given a quiet, comfortable pen. If the urine is not passed in a short time, to give further relief a sedative (tincture of opium one teaspoonful, or bromide of potassium half a teaspoonful) should be given. A warm water rectal injection in itself may prove sufficient to relieve the spasm.

Inflammation and abscesses in the region of the sheath should receive the proper surgical treatment (see Treatment of Inflammation of the Prepuce). Pressure on the urethra by a tumor can be relieved in some cases by an operation for its removal.

DISEASES OF THE SPLEEN

INFLAMMATION OF THE SPLEEN—SPLENITIS

Inflammation of the spleen is frequently mentioned in old works on veterinary medicine, and an elaborate line of symptoms is given in connection with the disease.

Most of the observations on this disease have been made on post-mortem examinations of animals. It is not uncommon to find the spleen inflamed in infectious diseases. Outside of its occurrence in this class of disease it is of little importance.

STRUCTURAL DISEASES OF THE SPLEEN

Hypertrophy, atrophy, and rupture of the spleen in hogs is recognized only on making a post-mortem examination. The latter condition may arise from an injury. Splenic hypertrophy is frequently associated with high feeding and infectious diseases. Tumors of the spleen may also cause it to become larger than normal. These different structural changes may occur as a result of an inflammation extending from a neighboring part.

DISEASES OF THE RESPIRATORY TRACT

COLD IN THE HEAD—NASAL CATARRH

Causes.—Exposure to cold, especially if the animal is in an overheated condition or the body wet with snow and rain, is the most common cause of a simple cold. Hogs kept in crowded pens, or allowed to sleep around straw stacks and manure heaps, are very apt to suffer as a result of becoming overheated and chilled, or from irritation to the air passages by the noxious gases and dust formed under such conditions. This is especially true during the cold weather, when a large number of hogs are allowed to sleep in the same quarters.

Symptoms.—The hog acts dull and feverish, and the eyes appear red and watery. During the first or dry stage of the inflammation, which lasts for a short time, the animal sneezes frequently. This may be followed by a thin, watery discharge from both nostrils. Later the discharge may become heavier and pus-like, and white or yellowish in color. If this continues for some time, the mucous membrane lining the nose is thickened and changed in appearance, and may become ulcerated.

Severe outbreaks of nasal catarrh are known as malignant catarrh. The disease does not run a well-defined course, and the inflammation may extend

to other parts of the air passages—throat, bronchial tubes, etc.

Treatment.—The preventive treatment is very important, and consists in avoiding the overcrowding of pens, especially during the cold weather, exposure, and allowing the pens to become dusty and dirty. Hogs should not be allowed to sleep around straw stacks and manure heaps.

In the simple form of the disease medicinal treatment is usually unnecessary. The hog should be given dry, comfortable quarters, and fed warm slops for a few days. It is usually best to give the animal a physic of castor-oil. In addition to this treatment, in severe cases the animal should be steamed. A vessel containing a one-half per cent. solution of turpentine, or some of the tar disinfectants, in boiling hot water can be held under the hog's snout, and the animal allowed to inhale the steam for about fifteen minutes, twice daily. It is also well to disinfect the pens and sleeping-quarters.

SORE THROAT—PHARYNGO-LARYNGITIS

The causes and symptoms of inflammation of the pharynx and larynx in the hog are very much the same. This is also true of tonsilitis, and, usually, all of these parts are inflamed at the same time and can be discussed conveniently under the head of sore throat.

Causes.—Sore throat frequently occurs as a complication of a cold in the head. In adition to the causes mentioned in connection with this latter

disease can be given wallowing in cold springs and creeks when the body is in an overheated condition, being deprived of water and slop during a warm, dry spell, close, filthy pens, debility, septic germs entering the mouth and throat along with the food, and the germs of hog cholera and swine plague. Filthy pens often contribute to the infection of the throat with septic germs, and the formation of abcesses and ulcers on the lining membrane.

Symptoms.—There is more or less fever, the eyes are red and watery, and the animal is dull and lies around the pen most of the time. The appetite is poor, and because of the pain and difficulty in swallowing, the hog may refuse food. The pain in the troat is sometimes sevére, and causes the animal to move about in a restless manner.

The character of the cough depends on the parts inflamed. When the larynx is involved, the cough is usually hoarse and the breathing noisy and labored, as the glottis is more or less closed by the inflammation. At other times it is dry, and when the hog moves about, or the parts are irritated by dust, cold air, etc., a coughing spell usually comes on. The throat may appear swollen.

In germ infection from the feed and filth, and in infectuous diseases (swine plague, hog cholera, etc.), false membranes may form, or the mucous membrane lining the part becomes gangrenous and ulcerated. In such cases the disease usually develops rapidly, and the air passages become closed within a few hours by the swelling and membranes.

Sometimes, it is the local ulceration and the general diseased condition that causes death.

Simple sore throat is not a serious affection, and lasts but a short time. The symptoms may be so mild as to escape observation. However, if the conditions are favorable, it may recur and assume a severe form or become chronic.

Treatment.—The preventive measures for sore throat are the same as recommended for cold in the head. It is very important, when the disease is caused by germ infection, to clean and disinfect the hog houses and pens. The sick animals should be separated from the well, in order to prevent the disease from spreading. The character of the food supply should also be considered, and, if faulty, corrected.

It is best to feed the sick animals a sloppy diet in order to avoid irritating the throat, and it should be fed warm during the cold weather. Mild liniments can be rubbed on the throat daily. After the acute part of the inflammation has passed, blisters may be used instead. Powdered cantharides (one part), and vaseline (eight parts) make a very effective blistering ointment, especially in such cases as show a tendency to become chronic.

The internal treatment consists in swabbing the throat with an antiseptic wash, and giving the animal an electuria to help relieve the irritated membranes. An electuary made of syrup (three ounces) and tincture of aconite (two drams) can be given in teaspoonful or tablespoonful doses three times a day.

Before swabbing out the throat it is necessary to confine the hog by placing a noose around the upper jaw. The handle of the swab should be of wire, so that the animal cannot bite it in two. A wash of silver nitrate (one part), and water (one hundred parts), or permanginate of potassium (two parts), and water (one hundred parts) can be used.

When the throat becomes ulcerated and gangrenous, treatment is of little use.

INFLAMMATION OF THE BRONCHIAL TUBES—BRONCHITIS

Inflammation of the lining membrane of the bronchial tubes may be either acute or chronic. The chronic form is the more common. There are other forms of the disease, as croupous, capillary, etc., that are classed according to the character of the inflammatory lesions, but it is more convenient to discuss bronchitis under the head of acute or chronic.

Causes.—Pigs are more subject to this disease than older animals. The most common cause is irritation from dust and lung worms. The irritation caused by inhaling dust may be due to other than mechanical causes, as disease producing germs capable of causing an inflammation of a serious nature may be carried into the air passages along with the dust.

Allowing hogs to sleep around old straw stacks, manure heaps, and in overcrowded filthy pens, or poorly ventilated sleeping-quarters, can be especial-

ly mentioned as causes of this disease. Under these conditions the air which the animals breathe becomes charged with the irritating gases from the bodies of the hogs and the surrounding filth, as well as from the air given off from the lungs. Fumes from irritating drugs may also cause it, and it may develop as the result of a severe cold.

Symptoms.—In the acute form the first symptom noticed is a feverish condition and a loss of appetite. The hog is depressed, the respirations are quickened, and the irritated condition of the lining membrane of the air passages causes the hog to cough. Little or no discharge from the nostrils occurs, unless the bronchitis develops from a severe cold. These acute symptoms do not last more than a day or two, and, outside of a cough, the animal appears well. Pigs are especially prone to coughing spells, during which mucus is coughed up and drops from the mouth. These attacks usually occur on leaving the bed and on exercising, and when the air passages are irritated by dust.

Acute bronchitis does not run a definite course, and if the exciting causes are kept up, may terminate in the chronic form or an inflammation of the lungs. In the chronic form unthriftiness and a cough are the most prominent symptoms. Pigs seldom die of this affection.

Treatment.—The treatment is largely preventive, and consists in avoiding such conditions as may lead to an irritation and inflammation of the air passages. The hog should be given clean, com-

The respiratory sounds become more or less changed from the normal. The cough is at first deep and dry, later more loose and moist. It may be accompanied by a hemorrhage during the first stage of the disease. Other respiratory sounds are revealed by placing the ear to the side of the chest wall and listening to the sounds in the lungs (auscultation). This cannot be practiced in fat or restless hogs with satisfaction, as the chest walls are so thick that the lung sounds are deadened, or the noise made by the animal hides the respiratory murmurs.

In the very early stages of pneumonia a crepitating or crackling sound can be heard in the diseased parts and louder sounds than normal in the healthy areas. Later, when the engorgment of the lung tissue occurs and the air cells become filled by the inflamamtory exudates, the respiratory sounds are deadened. On returning to the normal, rattling sounds occur. These symptoms help greatly in determining the animal's condition and in watching the progress of the disease.

The chances for recovery depend on the extent and acuteness of the inflammation. Careless handling, exercise, etc., lessen the chance for a favorable termination in this disease, and good nursing helps more in bringing about a recovery than the medicinal treatment. The prognosis is more unfavorable in fat than in lean hogs, as the inflammation is usually more severe in the former. The course of the disease is from one to three weeks, and it may

of the lungs. This may occur when they are chased by dogs and boys, or when driven to a distant market at too rapid a pace. Exercise during the hot summer months is apt to cause congestion of the lung tissue as well as heat-stroke. Washing or diping hogs during the cold weather may chill the body and result in disease.

Symptoms.—Pneumonia following as a result of a bad cold is preceded by the symptoms of the primary disease. If due to severe exercise, the animal appears greatly exhausted and the congestion of the lungs is marked. Death may occur in this stage of the disease.

Inflammation of the lungs usually begins with a chill, and is followed by a high fever. The hog lies down most of the time, hiding under the litter, and may eat nothing or but very little. The respirations are hurried at first, but when the lungs become badly involved they are also labored. The character of the pulse-beats vary, depending on the extent of the inflammation and the stage of the disease. In most cases it is full and quick during the early stages, but later, as the condition of the animal improves, more nearly normal. A very weak pulse is present in severe and fatal pneumonias.

The visible mucous membranes have a red, congested appearance, and there may be a slight discharge from the nostrils. The expression of the face is anxious and distressed in severe cases, and rigors and chilling of the body occur.

fortable quarters and a light ration. During the early stages of the disease, steaming the animal two or three times a day may give relief. This part of the treatment is the same as recommended in a catarrhal cold.

In chronic bronchitis good care and nourishing feed will enable the animal to outgrow the disease. Such complications as sore throat and pneumonia should receive the necessary treatment.

INFLAMMATION OF THE LUNGS—PNEUMONIA

Acute congestion and inflammation of the spongy tissue of the lungs is met with in hogs, the same as in other farm animals. Inflammation of a part or a few lobules of the lungs is frequently met with when lung worms are present.

Causes.—Fat, plethoric hogs, because of their condition, are especially predisposed to pneumonia. The exciting causes are very much the same as in the different diseases of the air passages, and it is not uncommon for the inflammation to extend from these parts to the lungs. However, there are a number of causes in adition to those already mentioned. It frequently occurs when hogs accustomed to warm, comfortable quarters are changed to cold, draughty pens, or shipped some distance in open stock cars during the cold weather. In fact, any sudden chilling of the body is a common cause of lung disorders. Giving fat hogs too much exercise, when they are not accustomed to it, is a frequent cause of engorgement and inflammation

become chronic if the irritation is kept up. In such cases unthriftiness is a prominent symptom.

The above symptoms are not seen in all cases of pneumonia. In bronchial and lung worm diseases, a small part of the lung tissue may be involved, and the symptoms resemble these diseases more than they do pneumonia.

Lesions.—The character of the lesions differ in the different cases. If death occurs within a few days after coming down with the disease, a large part of the lungs may appear solid and liver-like in color and consistency (hepatization). Later a part becomes lighter in color (gray hepatization). This marks the beginning of the degenerative changes of the inflammatory exudates and the return to the normal. On cutting into the tissue that has reached this stage, a purulent or fatty-looking fluid may exude from the cut surface. A part may have reached a later stage, that of resolution, and the absorption of the inflammatory exudates begun. Suppurative changes in the lung tissue may also occur.

In lobular pneumonia the lesions vary more than in the form just described. The bronchial tubes may be plugged with mucus and inflammatory exudates, and the lining membrane inflamed. Small areas of lung tissue undergoing different stages of inflammation are seen scattered through the lung, with here and there dark colored, depressed portions in which the air cells have collapsed (atelectasis). Some lobules may appear bulging and

lighter in color than normal (emphysema). Suppurative centers may also be observed.

Treatment.—The preventive treatment in pneumonia must not be overlooked. Briefly, it consists in avoiding such conditions as may predispose the animal to the disease, or act in any way as an exciting cause.

Careful nursing is a very important part of the treatment. The hog should be given a comfortable, well-ventilated pen, and kept as quiet as possible. To keep the bowels from becoming constipated, one or two ounces of castor-oil should be given daily, if necessary, and a light, sloppy diet fed. In severe cold weather, the animal must be kept from chilling and taking more cold by covering it with a blanket or using artificial heat. As one attack predisposes the hog to a second, it should be protected from severe cold, or the other extreme, heat, for a few weeks after making a complete recovery.

As a counter-irritant to the sides of the chest the following liniment can be used: oil of turpentine (ten parts) and croton-oil (one part). If the heart action is weak, from five to ten drops of tincture of digitalis should be given every few hours. During the convalescent period alcoholic stimulants can be used if necessary.

INFLAMMATION OF THE PLEURA—PLEURISY

Pleurisy is an inflammation of the serous membrane lining the chest cavity and covering the

lungs. Many of the causes of pleurisy are the same as in pneumonia. Because of this and the intimate relation of the pleura to the lung tissue, both of these diseases frequently occur at the same time. Pleurisy may be either acute or chronic.

Causes.—The most common cause is a sudden chilling of the body. Cold, damp, chilly weather and damp, chilly, draughty pens are favorable conditions for chilling of the body to occur and the rheumatic form of pleurisy. Germs may also cause it. It is commonly met with in such specific diseases as hog cholera, swine plague, and tuberculosis.

Symptoms.—Chilling and a high fever are among the first symptoms of pleurisy. The hog refuses to eat and acts dull. Pain is a prominent symptom, and when the sides of the chest are pressed on with the hands, the hog will flinch—sometimes grunt and squeal. This is very noticeable during the early stage of the inflammation, and may cause the animal to act restless. The breathing is always characteristic. The ribs are held rigid, and the respiratory movement is mostly in the muscles of the flank, the hog getting its breath in a short, jerky manner. Later, when fluid collects in the chest cavity, the breathing is more labored, and all of the respiratory muscles are used. On the absorption of this exudate the movement may again become jerky in case the inflammation becomes chronic. The character of the pulse-beats vary, and in some cases are very weak.

In the early part of the disease friction sounds, caused by the dry, inflamed membranes rubbing against each other, are heard on placing the ear against the chest walls. Later the collection of fluid around the lungs may deaden all lung sounds toward the lower part of the chest. In this stage of the inflammation, if the fluid forms in large amounts, the respirations become very labored.

The symptoms are mild if the pleurisy is localized—that is, only a part of the membrane inflamed. A lameness in both front limbs and stiffness in moving about are the most noticeable symptoms in this form of the disease.

In chronic pleurisy the hog is usually very weak and depressed. It is frequently seen lying on its side, and unable to get up and walk about. The inflammation may extend to the heart and its coverings, and the symptoms of these diseases are manifested.

The course of acute pleurisy is one or two weeks. The chronic form may run a course of several weeks. The prognosis is very unfavorable.

Lesions.—The serous membrane is thickened and inflamed. Its surface is roughened and covered with membranous growths and fibrous bands that attach the lungs to the chest walls. The latter condition is a constant lesion in old, chronic inflammations. In the exudative form of the disease (hydrothorax) more or less fluid is present in the chest cavity. This may be yellowish or reddish in color and hold in suspension fibrous flakes or

clots, which may remain for some time after the fluid is absorbed. In case the fluid becomes infected with pus germs it loses the appearance of a serous fluid, becoming heavier and pus-like.

Treatment.—Preventive treatment is about the same and of like importance as in other respiratory diseases.

Good care at the beginning of an attack of pleurisy tends to prevent its becoming serious by checking the inflammatory changes. The hog should be given a warm, clean place, and made as comfortable as possible. In warm quarters, and when the animal is quiet, warm packs can be applied to the sides of the chest and the body covered with a blanket.

The medicinal treatment does not differ greatly from that recommended in pneumonia. It is best to give the hog a physic early in the attack and feed a sloppy diet in order to keep the bowels lax. It is advisable to give the animal a teaspoonful of syrup of squills and five drops of tincture of aconite every few hours for the purpose of relieving the inflammation and pain, which is usually very marked in the early stages. The same blistering liniment, as prescribed for pneumonia, can be applied to the chest walls. The following febrifuge can be given every few hours: sulphate of quinine (fifteen grains) and nitrate of potassium (ten grains). As soon as the fever leaves the patient, this part of the treatment should be discontinued. The use of tonics and nourishing feeds make up the necessary treatment during convalescence.

DISEASES OF THE HEART

HEART DISEASES IN GENERAL

Diseases of the heart are not uncommon in hogs. Inflammation of the lining membrane (endocarditis), and the covering of the heart (pericarditis), and the heart itself (myocarditis) are sometimes met with in such diseases as pleurisy, rheumatism, hog cholera, and swine plague.

Symptoms.—These are usually overshadowed by the original ailment. Palpitation of the heart may occur. The pulse is usually small, quick, and irregular, the body temperature much higher than normal, and the hog depressed and restless because of the severe pain and the serious character of the disease. This line of ailments usually ends in death.

Treatment.—The treatment of acute heart-diseases is very unsatisfactory. About all that can be done is to keep the animal quiet and relieve the pain. Ten to twenty drops of tincture of opium can be given every few hours. To regulate the heart-beats, twenty to thirty drops of tincture of digitalis should be given at frequent intervals. Blisters and blistering liniment may be applied to the walls of the chest just over the region of the heart. This latter treatment is usually followed by good results.

When acute heart-diseases occur as a complication of some other disease, the treatment should be directed at the primary ailment and the above used in addition to it.

FATTY DEGENERATION OF THE HEART

Causes.—Fatty degeneration of the heart is brought on by overfeeding and lack of exercise. Fat accumulates in masses around the heart and in the muscular tissue, replacing to some extent the latter, and the ability of this organ to do the required work is either hindered or destroyed.

Symptoms.—The animal is generally very fat and unfit for any kind of exercise, and may die suddenly if this is attempted. About the only symptoms noticeable are difficult breathing and irregular, weak heart action. Palpitation may also occur.

Treatment.—The treatment is wholly preventive, and consists in avoiding such conditions as may cause the disease. To sustain the heart action, heart tonics and stimulants, such as nitroglycerin, digatalin, and digitalis can be used. The fatty condition of the body should be reduced by dieting the animal.

SPASM OF THE DIAPHRAM—THUMPS—PALPITATION

True palpitation is a convulsive, violent beating of the heart, often not connected with any structural disease of the organ. It sets in suddenly, the heart sounds are louder than normal, and the shock of the beats

quite noticeable. The pulse-beats are quickened and somewhat irregular, and the animal may appear restless and anxious. Excitement and exercise sometimes cause this condition, or it may occur in connection with some digestive disorder and a spasm of the diaphragm. It may also occur in acute heart disorders.

Spasm of the diaphram is quite common in pigs. It is due to an irritated condition of the nerves (phrenic) going to the diaphragm. Digestive disorders, especially overloading of the stomach, and lack of exercise are the main causes. It is not uncommon for a large number of pigs in the same litter or in the same pen, when too closely confined, to have thumps.

Symptoms.—The most prominent symptom occurring in thumps is a sudden jerking movement of the flank. This is very noticeable when the pig is standing quiet, and may be of such force as to move the body backward and forward. The shock of the contraction of the diaphram is accompanied by a sound in some cases. The spasmodic contractions do not occur regularly, but irregularly, and are much more frequent at times when the stomach is full than when it is empty.

The digestive diseases, as well as the thumps, interfere with the growth and thriftiness, and the pig becomes more or less stunted. Sometimes they lose flesh quite rapidly and become quite thin.

The course of the disease is from a few days to several weeks.

Treatment.—The preventive treatment of thumps in young pigs is good care and plenty of exercise. Exercise alone will generally effect a cure.

When the disease develops in a litter of pigs, they should be turned on pasture and given plenty of opportunity to run about. If this cannot be done, they should be exercised in some other way, as placing them in a pen or box away from the mother. To relieve the spasms, tincture of opium can be given in from three to fifteen drop doses three times a day. A small dose of castor-oil should also be given in order to prevent constipation. The indigestion should be treated by regulating the diet and giving a course of bitter tonics, if necessary.

DISESASES OF THE NERVOUS SYSTEM

CONGESTION AND INFLAMMATION OF THE BRAIN

In congestion and inflammation of the brain in hogs, both the brain and its coverings are involved in most cases, and for this reason it is unnecessary to attempt any division or classification of these diseases in a work of this kind.

Causes.—Fat, plethoric hogs are predisposed to this class of disease. The exciting causes are sunstroke, severe exercise, tumors and parasites pressing on the nerve tissue, blows on the head, and diatetic causes. Certain feeds containing poisonous substances, when eaten in large quantities, may lead to brain disorders. Eating feeds containing molds and bacterial ferments, or poisons, sometimes cause it. The feeding of large quantities of food rich in albumenoids is especially harmful.

Another cause is unhealthy surroundings, such as poorly ventilated, filthy quarters. Inflammation of the brain may also occur in some infectious diseases.

Symptoms.—The symptoms usually come on suddenly. The hog may show symptoms of excitement, irritability, sensitiveness, drowsiness, etc., depending on the general condition of the animal and the direct cause of the disturbance. The disease may be

ushered in by a period of dulness, but in most cases the hog appears excited from the first. During the period of excitement or delirium it champs its teeth, froths at the mouth, walks or runs about the pen, generally in a circle and without showing much ability to dodge objects coming its way. It squeals and grunts, tries to climb up the sides of the pen, presses its head against the wall or fence, and finally falls over in a convulsion. In a short time it may regain its feet, or continue lying on the ground in a stupor, which finally ends in death. In heat-stroke sudden collapse, staggering gait, convulsions, and unconsciousness are the usual symptoms.

In moderate congestion of the brain, the duration of the disease is short and a complete recovery may occur. When the congestion is severe, it usually terminates in an inflammation of the brain, sometimes death. The outcome of the latter disease is unfavorable, and in most cases runs a short course.

Lesions.—The coverings of the brain are congested and inflamed, appearing thickened and reddened. If the inflammation is caused by a blow on the head, the skin and other tissues in the region of the injury show the effect of the blow, and the coverings are especially apt to show marked local lesions.

A portion of the gray matter of the brain, depending on the extent of the inflammation, is darker colored than normal and stained with blood. Small red areas may be seen scattered through the nerve tissue, and the whole structure is more or less soft-

ened. Bloody or straw colored liquid may collect in the cavities of the brain and between its membranes. Infection of this fluid with pus germs is a condition sometimes met with.

Treatment.—Preventive treatment consists in avoiding, as far as possible, such conditions as may cause the disease.

The success of the treatment depends largely on being prompt in the use of such curative measures as are available. It is very necessary that the hog be given a quiet, cool place, where it cannot be disturbed by other animals. Bleeding will greatly relieve the congestion or inflammation, if practiced in the early part of the attack. Cold applications to the head are of some value in relieving the blood pressure in the part. It is advisable to give a large dose of Epsom salts and follow this up with small doses of castor-oil daily. When the animal becomes paralyzed, iodide of potassium (twenty grains) and tincture of nux vomica (fifteen drops) should be given in a small amount of water three times a day.

BLIND STAGGERS—VERTIGO

Blind staggers is usually associated with diseases of the brain, such as anemia, congestion, tumors, and parasites (cysticerci), especially the latter. It may occur as a symptom of chronic indigestion, as a result of reflex irritation to the brain.

Symptoms.—These are attacks of blindness, jerking upward of the head, turning in a circle, or ro-

tating on the long axis of the body, running straight ahead and falling on the side, or rolling over and over. When caused by the cysticercus, the hog turns to the side on which the parasite lies, and the attacks are apt to occur at any time.

Treatment.—As vertigo is practically a symptom of disease, the treatment used is the same as given in the discussion of such diseases as it may be associated with. A sloppy diet should be fed. In cases where the attacks occur at intervals, it is best to destroy the animal and not attempt treatment. Hogs affected in this way become very unthrifty.

EPILEPSY—FITS

This disease is characterized by sudden loss of consciousness, convulsive movements, etc. In the intervals between the attacks the hog may appear in good health.

Causes.—Epilepsy is due to lesions in the spinal cord and brain. These may result from injury to the above organs. In some cases it is no doubt a hereditary disease and transmitted from the parent to the offspring. Inbreeding is cited as a cause by some writers. Intestinal worms are probably the most common cause of spasms in young pigs, the irritation to the intestines acting reflexly on the brain. It may occur at the time the animal is cutting its teeth.

Symptoms.—The pig may be restless just before the attack comes on. The convulsive movements generally begin in the muscles of the head and ex-

tremities. A jerking of the muscles of the face, champing of the jaws, and an unsteady gait are noticed at first. Suddenly the pig falls, consciousness is lost, the limbs are extended, and the seat of convulsive movements, the head is thrown back, saliva runs from the mouth, and urine is passed. Because of the muscles of respiration being involved, the animal has great difficulty in breathing.

In mild cases the spasms are feeble, and may cease in a short time. The attack usually lasts but a few minutes. The pig may act dull and sick for several days, and there is some danger of it dying during an attack. In true epilepsy the spasms occur periodically, and the pig usually becomes unthrifty and stunted.

Treatment.—The attack may be stopped by throwing cold water on the animal's head, or, better, by immersing its body in warm water. The latter can be easily practiced in pigs. A cathartic of castor-oil should be given, and the pig kept as quiet as possible. Until the stupor has completely passed, it is advisable to give from half a dram to a dram of bromide of potassium in the feed, or drench twice a day.

SUNSTROKE OR HEAT STROKE

Hogs, especially fat hogs, when driven or exercised on a very hot day, and when hauled or shipped to market during the warm weather, are very apt to become affected with the heat. This is due to their condition, the crowded quarters, and the lack of protection from the sun. When hogs are

kept in close quarters, the accumulation of heat is especially marked on a hot day. They may also suffer severely from the sun when kept in pastures and yards unprovided with shade.

Symptoms.—The principal symptoms are fatigue, drooping of the ears, staggering gait, sudden collapse, unconsciousness, and death. Convulsions may occur, and death generally follows in a short time. In all cases the pulse is very weak, and the body temperature is much higher than normal.

Treatment.—The preventive treatment consists in not handling hogs unaccustomed to exercise and excitement, especially when fat, in summer-time during the hottest part of the day. During the hot months hogs should be provided with the necessary protection from the sun's rays.

When shipping hogs in cars, wetting them frequently with water helps to keep them cool and prevent heat stroke.

A hog suffering from sun or heat stroke should be moved to a shady place, and cold water poured on the head and neck, but not on the rest of the body. As a stimulent, alcohol (one teaspoonful) and tincture of nux vomica (from half to one teaspoonful) can be given every three or four hours.

PARALYSIS OF THE POSTERIOR PART OF THE BODY

Causes.—Paralysis of the hind parts is frequently met with in growing hogs. It is due to a variety of conditions. Dr. Alexander states that it occurs in

rhachitis, when the thigh-bones become fractured, and is caused by feeding a ration deficient in mineral matter. It is frequently caused by small centers of inflammation in the spinal cord resulting from disease or an injury to the back, pressure on the cord from tumors, or an over-fat condition, and the encysting of parasites in this part of the nervous system. It is not uncommon for hogs that have been shipped in cars and crates to be affected in this way. Loss of control over the movement of the hind parts and other nervous disturbances sometimes occur in sows that are nursing a litter of pigs and are run down in condition. Injuries caused by the hogs piling on one another, indigestion, and constipation are said to cause this disease.

Symptoms.—The paralysis may come on gradually, and nearly always involves both hind limbs. In case the disease develops slowly, the first symptoms noticed is an unsteady gait, the hind legs not following in an exact line with the front ones, and, instead of walking directly forward, the hog appears to move sideways. Sometimes, the legs become crossed, and the animal may take this position when standing. After lying down there is more or less difficulty in getting up. These symptoms become progressively worse until the hog simply drags the hind parts, and is unable to get up or support its weight on the hind feet.

The appetite is usually good in the early stage and may remain so. Pressure over the back and loins does not cause the animal pain, but it may squeal

and seem to suffer severe pain when made to move or try to get on its feet. If recovery does not take place within a few days or a week, the appetite becomes poor, the bowels constipated, and the hog grows worse rapidly, and within a few days makes but little effort to get up. Such cases usually prove fatal within a short time.

Treatment.—This disease is one that can be largely prevented. Hogs should not be kept under conditions that predispose them to injury. Growing pigs should have plenty of room for exercise, and be fed a suitable ration in order to prevent a diseased condition of the bones. Fracture of the thigh-bones, as a result of a rhachitic condition, sometimes occurs, and is frequently mistaken for a paralysis, hence it is well to include the above preventive measures with the treatment of this disease.

As soon as the hog is noticed ailing, it should be given a pen by itself, and fed a light, sloppy diet. To prevent constipation and keep the bowels loose a physic of castor-oil should be given. If necessary, this may be supplemented by an enema of glycerine and water.

Counter-irritation along the back is indicated in this disease. Oil of turpentine (ten parts) and croton oil (one part) make a very useful blistering liniment. The firing-iron may also be used. Dr. Peters recommends the following method of firing the back: Fourteen or fifteen pieces of number sixteen wire, pointed at one end, are placed in a charcoal or corn cob fire and heated to a white heat. When hot as

desired they are grasped with a pair of pincers and the pointed ends plunged through the skin and into the fatty tissues. The skin should be punctured in places an inch or two apart.

In the way of general treatment nerve tonics should be used. The most useful drug for this purpose is tincture of nux vomica. From five to fifteen drops should be given two or three times a day. The hog must not be forced to walk, as this is very apt to retard recovery. After becoming able to use its hind parts, it should be kept away from the other hogs for a short time.

DISEASES OF THE GENERATIVE ORGANS

STERILITY—BARRENNESS

Through some fault of the male or female, sometimes both, conception does not follow as a result of copulation, and the female fails to breed. This condition may be due to a variety of causes, and is either temporary or permanent. Sterility is less common in hogs than in most farm animals.

Causes.—The most common cause of impotency or sterility in the male is lack of, or too much functional exercise, too close confinement, old age, and the feeding of an unsuitable ration or one that tends to fatten the animal. Fatty degeneration of the testicles may occur under such a condition, or at least they become so infiltrated with fat as to interfere with their function. Overly fat boars may become so clumsy and lazy that they cannot, or will not serve the sow. It is not uncommon for impotency to be due to an injured penis and an improper development of the sexual organs. Sometimes during copulation the penis is broken, bitten off and injured in other ways.

Sterility in the sow may result from a greater variety of conditions than in the boar. Excessive fattening, as is sometimes seen in sows fitted for exhibition purposes, is a frequent cause in this class of

animals. It may be due to the ovaries undergoing the same changes as do the testicles of the male under like conditions, or to the closure of the maternal passages by the accumulations of fat. In the former case the changes in the ovaries may be so great that they cannot return to the normal, and the sterility is permanent. In the latter it is usually temporary, and the function of the organs can be restored by reducing the condition of the sow.

Sometimes a rigidity and closure of the opening into the womb prevent the seminal fluid from entering it. Such a condition may occur in a young or aged sow. Inflammation of the lining membrane of the womb and the passages leading to it may also cause barrenness. In this disease a discharge, sometimes so slight as to escape notice, occurs, and the male element of the seminal fluid on coming in contact with it, is destroyed. In old age both sexes may fail to breed.

Faulty development of the sexual organs may occur in sows. The uterus may be abnormally small, the ovaries rudimentary or undeveloped, and the vagina and os not perforated. Hermaphrodites are sometimes met with in this species of animals.

Treatment.—Excessive fat is so often a cause of sterility in both sexes that more attention should be given to preventive than to curative measures. Breeding animals should not be fed a ration high in fat-producing elements. Exercise is also an essential part of the care, and should not be overlooked. In other words, we cannot expect the parents to be

productive, and have strong, healthy offspring, unless they are in a healthy condition themselves.

The male must not be used too freely, if young. The excessive use of the male at all times should be avoided. When he does not act as free as he should, a stimulating ration should be fed and more exercise allowed. Sterility in the female, caused by a closure of the opening into the womb, can be corrected by dilating the part the same as in other animals. Closure of the maternal passages with fat can be overcome by feeding a more suitable ration and permitting the sow to take plenty of exercise.

Sows having a discharge from the parts should not be bred. Local treatment with disinfectant and astringent solutions should be used until the leucorrhœal discharges stop.

ABORTION

Abortion is the expulsion of the young from the womb before it has become well enough developed to live outside of the mother. This accident may occur in the sow, but is not nearly so common as in ruminants. Two forms of abortion, sporadic and contagious, occur. The former variety is the more common.

Sporadic abortion is generally due to external causes. Sows well advanced in pregnancy may become injured in some way and slip their pigs. It occurs when the sows are kept in crowded quarters, or when allowed to sleep in exposed places during the cold weather. Crawling through small open-

ings in the pen, or crowding one another in going through gates, doors, etc., may also cause it. Other accidental injuries and conditions that sometimes cause abortion are kicks and blows in the region of the abdomen, becoming excited by other animals, such as dogs, sows in heat, etc., sudden falls, chilling, spoiled food, food containing ergot, digestive disorders, hog cholera, swine plague, and other diseases.

Infectious abortion in sows is not very well understood. It is not a common disease, and although the specific cause has not been discovered, this form of abortion is no doubt due to a specific germ. The conditions for spreading the infection from one herd to another are not so favorable as in some classes of farm animals, hence the disease does not spread rapidly.

Symptoms.—In abortion the parts are not prepared for giving birth to the young, and the act may be accompanied by marked nervous disturbances and pain. Birth may progress more slowly than when the conditions are normal. However, the symptoms depend largely on the period of pregnancy in which the accident occurs and its cause. When caused by an injury, the symptoms are more serious than when due to a specific cause (germs). In the latter period of pregnancy an accidental abortion is usually accompanied by a serious train of symptoms.

The sow acts uneasy, is sick, and refuses to eat. Abdominal pains may occur. The final symptoms are trembling of the muscles, or shivering, more or less straining, depression, and in some cases severe labor

pains, and a prolonged and difficult birth. Hemorrhage may occur. If not too sick, the sow is seen making a bed, the same as in a normal birth.

In the infectious form the symptoms are not usually marked. In the early period of pregnancy, the accident may cause so little disturbance as to escape observation for a time. Even in advanced pregnancy it causes but little disturbance. The parts are more or less prepared for the act, and as the young are small and not fully developed they are passed with ease. In most cases a chronic discharge from the vagina follows the abortion, and the sow remains sterile for several months.

An easy abortion is not usually followed by serious symptoms. The sow may act dull and feverish for a few days, and then show no further symptoms. Certain complications are apt to occur, such as hemorrhage and inflammation of the womb, peritonitis, and leucorrhœa. However, the outcome is favorable, and the animal makes a good recovery if given proper attention and care.

Treatment.—When the sow is pregnant, all possible precaution should be taken against accidental injuries, as little can be done to arrest the abortion after the disturbance has begun. All that can be done is to keep the sow as quiet as possible and give her comfortable quarters. To quiet her, tincture of opium should be given in teaspoonful doses every few hours. In case of a difficult abortion all necessary aid should be given, and any complication that may follow should receive prompt attention.

It is always a wise measure to remove the sow from the herd, as the abortion may be infectious and spread rapidly. In this latter form prompt measures must be taken against the spread of the disease. This consists mainly in disinfecting the pens, burning the afterbirth and dead pigs, and keeping the sows that have aborted away from the herd. The leucorrhœa that may follow should be treated by injecting the womb and maternal passages with a one per cent. water solution of some of the tar disinfectants daily, and keeping up this treatment for as long a time as necessary. The sow must not be bred until the discharge from the parts has stopped.

INFLAMMATION OF THE UTERUS AND VAGINA

Causes.—Inflammation of the womb and the passages leading to it frequently occurs as a complication of a difficult birth, or as a result of the retention of dead fetuses and decomposition of the afterbirth. Herdsmen, when assisting in a difficult birth, may injure and infect the parts with germs, causing the lining membrane of the uterus and vagina to become irritated and inflamed. Dirty hands, cords, and instruments are the usual sources of germ infection at the time of birth.

Symptoms.—The disease usually occurs in connection with a difficult birth and the retention of one or more dead pigs. The character of the symptoms depends on the extent of the inflammation. In serious cases the temperature is higher than normal,

the animal acts feverish and dull, the respirations and pulse-beats are quickened, the appetite lost, and the pain more or less severe. The sow remains in her bed most of the time. When she gets on her feet and moves about, the gait is unsteady and staggery. This results from weakness and the soreness in the hind parts. When the hand is introduced into the vagina the parts feel hot, and the visible part of the mucous membrane lining the vulva is red and inflamed. Within a few days a discharge from the vulva occurs, and if the afterbirth and one or more dead pigs are retained, the sow strains frequently and endeavors to expel them. Shivering also occurs.

In the severe cases the disease usually terminates in death. The sow grows weak rapidly, and dies in a short time after coming down with the disease.

In the mild form marked general disturbances, such as loss of appetite, fever, and severe pain, do not occur. Sometimes the inflammation takes on a chronic form and continues for several weeks. A disagreeable discharge containing portions of decomposed pigs and membranes is passed, and the animal becomes very unthrifty, or the discharge may be so slight as to escape notice. Unless treated, it usually continues for weeks. Peritonitis is not an uncommon complication.

Treatment.—Preventive measures are of the greatest importance in this disease. Dirty hands and instruments must not be introduced into the genital canal. When giving the necessary aid in a difficult birth, the operator should avoid injuring the organs,

and take the necessary precautions against infecting them with irritating germs.

The treatment should be used before the inflammation has had an opportunity to spread to the neighboring parts. The sow should be given comfortable quarters and good care. To keep her strength up, we should coax her to eat, and give her stimulants and

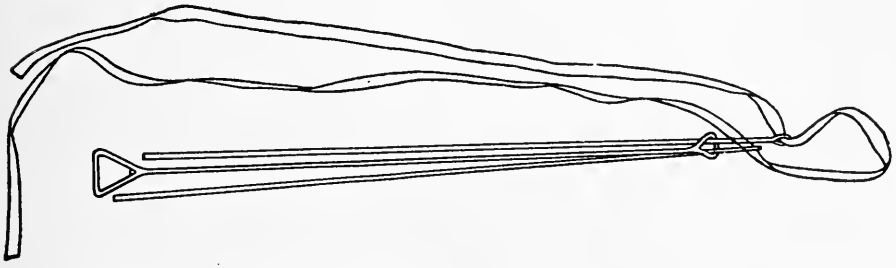


FIG. 6—A PIG EXTRACTOR ("CINCH")

tonics, if necessary. The local treatment consists in injecting the womb and vagina with some reliable tar disfectant solution. Some form of a fountain syringe should be used in giving the injection, and a one or two per cent. water solution of the disinfectant used. In bad cases the above treatment is repeated twice a day for as long a time as necessary.

INVERSION AND PROLAPSUS OF THE VAGINA AND UTERUS

This accident usually follows birth. Only a part of the genital canal, or womb, may be involved, and it is seldom that a complete prolapsus of the parts occurs. The chief symptom is a tumor-like mass

protruding from between the lips of the vulva, or hanging some distance below the opening.

Treatment.—The treatment consists in cleaning the parts with warm water and disinfectants, reducing the congestion in the tissues, and returning the mass to its normal position. This is generally no easy task, and may cause the sow a great deal of pain. If the parts are inverted to such an extent as to expose a large part of the lining membrane, it becomes swollen and inflamed, sometimes injured and gangrenous. The size of the tumor-like mass may become greatly increased by the distended bladder, as the canal leading from the bladder is so pressed on that urine cannot be passed. All of the above conditions must be relieved before the accident can be successfully corrected.

To reduce the size of the mass it should be bandaged, beginning at the outer end and winding toward the body. It is best to use a clean muslin bandage about two yards in length. This should be allowed to stay on for about ten or fifteen minutes and hot water fomentations used. This should be repeated as often as necessary, or until the tissues are in a fit condition to be returned. When badly injured, or gangrenous, the only thing that can be done is to amputate the mass.

In returning the organs the finger, or thumb is pressed against the center of the tissues, and they are shoved forward and replaced in their normal position. They are then retained in position by taking a few stout stitches across the opening and to each side of

the lips of the vulva. The vagina should be injected once a day for a few days with an astringent or disinfectant wash in order to relieve the irritated condition of the mucous membrane. The stitches are re-

FIG. 7—BLACK OR PIGMENTARY TUMORS FROM SOW'S UDDER

moved as soon as further danger from inversion is over.

INFLAMMATION OF THE UDDER—GARGET

Causes.—Inflammation of the udder commonly occurs in heavy milkers, and is caused by all of the milk not being removed. Frequently, it occurs as a result of the milk accumulating in the udder when the sow has lost a part of her litter. Other causes

are obstructed teats, injuries to the glandular tissue, and infection from germs. Congestion and inflammation of the udder sometimes follow a difficult birth.

Treatment.—Milking the sow's udder two or three times a day will usually relieve its congested condition. A physic of Epsom salts should be given every other day, and a sloppy diet fed. In case the udder becomes inflamed it should be kneaded gently with the fingers, and the following ointment applied daily: Extract of belladonna and gum camphor (one dram of each), and vaseline (three ounces). Hot fomentations may also be used.

Sore teats should be bathed daily with white lotion (one part zinc sulphate, three-fourths of a part lead acetate, and thirty parts water) until healed.

INFLAMMATION OF THE TESTICLES—ORCHITIS

Inflammation of the testicles in the boar is generally caused by blows, kicks, and bites from other animals. It may also occur as a result of an inflammation extending from a neighboring part and germ infection, or as a complication of some infectious disease.

The symptoms are mostly local, the testicles and scrotum appearing swollen, tender, and inflamed. The pain is manifested by a straddling gait. In severe cases the hog acts dull, and stays in bed most of the time.

Treatment.—If the inflammation is mild, the only treatment necessary is to give a physic and feed a light diet. In severe cases it is necessary to apply

hot water packs, or clothes that have been wrung out in hot water, to the part, in order to keep down the inflammation. This should be persevered with until the acute part of the inflammation has subsided. A water solution of iodine should then be applied to the scrotum (iodine crystals, one and a half parts; iodide of potassium, one part; and water, twenty parts). Twenty grains of iodide of potassium should be given in the feed twice a day for a few weeks.

If an abcess forms, it is necessary to castrate the boar and wash out the part with a disinfectant solution. This should not be postponed until too late, or the animal may die. Degeneration of the testicles sometimes occurs. Water sometimes forms in the scrotum as a result of the inflammatory changes.

WATER IN THE SCROTUM—HEMATOCELE—HYDROCELE

This condition is seldom met with in hogs. The usual cause of fluid collecting in the scrotal sack is an inflammation of the covering of the testicle (tunica vaginalis). This may follow as the result of an injury to the walls of the scrotum. A small water seed (hydrocele) may occur as a complication of castration, when the operation is performed carelessly.

Symptoms.—The swelling is soft, elastic, and painless, and confined largely to the lower part of the scrotum. When a large quantity of fluid (serum, or blood and serum) collects between the layers of the tunic or at the end of the cord, it may resemble a

rupture or scrotal hernia. However, when pressed on with the fingers, the movement of the fluid in the sack enables the examiner to determine the difference between these two conditions.

Treatment.—In most cases treatment is unnecessary, as the disease does not interfere in any way with the animal's health. If treatment is desirable, the fluid can be drawn off with an aspirating syringe and tincture of iodine injected into the cavity. This operation must be performed under aseptic conditions in order to prevent germs from entering the part. In some cases it is advisable to castrate the animal. Where this condition follows castration, all that is necessary is to dissect out the sack.

INFLAMMATION OF THE PREPUCE OR SHEATH

This condition is usually caused by the secretions and dirt accumulating in the sheath and its side folds. The irritation caused by the dirt inflames the lining membrane, and the glands in the part secrete more actively. Infection from pus germs usually follows, and the tissues become badly inflamed if not treated promptly.

Symptoms.—The symptoms are usually local, and confined to the region of the sheath, or prepuce. The tissues become swollen, painful, and hot, and when badly swollen there may be some difficulty in passing urine. The animal seems to suffer some pain. When the swelling is pressed on, it causes the hog pain, and a disagreeable-smelling fluid-like substance, often cheesy in character, may be forced out. In case the

flow of the urine is interfered with symptoms of retention of the urine develop.

Treatment.—It is necessary to confine the hog by placing it on its back in order to treat it. The outside of the sheath should be first fomented with hot water, and freed from any secretions and dirt that may have collected on its surface and around the opening into it. The collection in the sheath can then be broken down with the fingers or nozzle of the syringe, and the part irrigated with a warm water solution of some disinfectant. All of the material must be removed and the part thoroughly cleaned. If it is impossible to do this through the opening at the front of the sheath, an incision large enough for the purpose must be made in one or both side folds.

The after treatment consists in irrigating the prepuce with an antiseptic wash once a day for as long a time as necessary.

DISEASES OF THE SKIN

NETTLE-RASH—URTICARIA

Urticaria is an acute skin disease in which the cellular tissue becomes infiltrated with fluid from the capillary blood-vessels, and flattened blotches or swollen spots form on the skin. They are not limited to any particular region. This disease occurs mostly in young pigs.

Causes.—The most common causes of urticaria are irritation to the skin by lice, dipping and sprinkling hogs with irritating solutions (kerosene emulsion), and filth. Well-fed young hogs seem to be predisposed to this disease. Leguminous forage crops are said to cause it. It may accompany other diseases, especially infectious diseases.

Symptoms.—The blotches come on the skin very suddenly, frequently during the night, and are most numerous and noticeable on the ears, sides of the neck, back of the arms, inside of the thighs, or wherever the skin is thin. They appear as swollen red spots that vary greatly in size. Several spots may run together and form large blotches an inch across. Because of the intense itching, the hog will scratch and rub the inflamed skin, and the surface of the blotches appears red and moist.

While the irritation lasts the hog is very restless,

and there is a noticeable check in their thriftiness. However, the disease is not serious as a rule, and the disagreeable symptoms caused by the skin irritation pass off in a few days. We must not make the mistake of including the symptoms of the primary disease with those of urticaria, when the latter occurs as a complication. This mistake is sometimes made by some writers. Pustules are said to form in severe cases.

The disease is not contagious. Its presence in the whole herd can be explained by the predisposition on the part of the animals, and the extent of the causative factor or factors.

Treatment.—The preventive measures against the disease consist in keeping growing hogs in clean quarters, and avoiding the use of irritating preparations on the skin. There are plenty of non-irritating washes and dips that can be used for the purpose of destroying lice and cleaning the skin, without resorting to the use of irritating preparations.

At the beginning of an attack of urticaria a physic should be given the animal. Epsom salts is best, and can be given in the feed or as a drench. The hogs should be kept in a cool, shady place, and fed a sloppy diet. In severe cases some writers advise dosing the animals with Fowler's solution. The dose is ten drops in the feed for each hundred pounds live weight, twice a day.

After the hogs have recovered, if dirty or lousy, they should be dipped in a one or two per cent. water solution of some tar disinfectant. The premises

should also be cleaned up. It is not an easy matter to get rid of hog lice, and it may be necessary to move the animals to new quarters for a few weeks. A two per cent. solution is more effective for destroying lice than a one per cent., and the herd should be dipped twice at intervals of one week or ten days. After dipping or washing them, the hogs should be kept out of the hot sun until dried off.

PITCH MANGE—ECZEMA

Acute and chronic inflammation of the skin is not an uncommon disease in hogs. This is not due to a susceptibility of this class of animals to skin diseases, but more to the conditions under which they are kept.

Causes.—This disease is associated with unhygienic conditions, filthy pens, extremes of heat and cold, and a debilitated condition. Light skinned hogs and those having a light coat of hair are apt to suffer from inflammation of the skin during the hot weather, as a result of irritation from the sun's rays, especially if kept in muddy yards. A severe sloughing of the skin may occur if hogs are allowed to wallow in pools of water, that sometimes form in the places where corn-cobs have been burned into charcoal. Eczema sometimes occurs in a drove of hogs that are kept on marsh land because of the irritating properties of the soil. Inflammation and sloughing of the skin may occur in hog cholera, articular rheumatism, and other germ diseases.

Symptoms.—In white hogs the affected parts of the skin may appear red, inflamed, swollen, and tender.

In moist eczema small red spots appear first, and are followed by vesicles or blisters. In a short time these change to pustules. All stages of the inflammation may be seen. When the pustules dry up, crusts are formed. In hog cholera the affected parts of the skin finally become dry and hard, separate from the

FIG. 8—A SKIN DISEASE CAUSED BY MUCK DIRT

healthy skin, and slough off. In case the inflammation is caused by severe irritation, cracks form in the skin on the back, ears, and other parts of the body, and may form large sores.

The pain and irritation usually cause the hog to act restless. In some cases the appetite is poor, and the hog acts dull and feverish.

Treatment.—The preventive treatment consists in avoiding, as much as possible, such conditions as may irritate the skin. Filthy surroundings should be avoided, and the hogs kept in a thrifty condition.

When the hogs are kept in muddy yards, they

FIG. 9—WART FROM THROAT OF HOG

should be occasionally washed, or dipped, in a one per cent. water solution of a tar disinfectant. Keeping the hogs clean is a very necessary part of their care, and a dipping-tank should be a part of the equipment in the hog yards.

SKIN WARTS

Warts are growths on the skin caused by piled up epidermal cells, or hypertrophy of the papillæ of the

skin. Weak, debilitated hogs seem to be predisposed to warts, or more likely, the condition of the individual is the cause of the malnutrition of the skin. Irritation to the skin by dirt, etc., may also cause it. Warts are said to result from specific causes (germs).

If the cause of the warts is known it should be removed. Large warts can be cut off with a knife or a pair of scissors. A preparation of a dram of salicylic acid and an ounce of castor-oil, rubbed on the warts once a day for a week or more, may remove them.

DISEASES OF THE LOCOMOTORY ORGANS

ARTICULAR AND MUSCULAR RHEUMATISM

Articular and muscular rheumatism are so frequently associated in this class of animals, that it is best to discuss both at the same time. Although hogs live under favorable conditions for the development of rheumatism, they do not contract this disease as often as some of the other domestic animals. This is probably due to the abundance of fatty tissue and the protection it affords the animal.

Causes.—This disease is generally attributed to cold, damp pens and exposure, but it may occur in hogs that are well cared for. Overfeeding is also said to cause it. Specific causes, unless it is in articular rheumatism, should not be considered in discussing this disease. At the beginning of an outbreak of hog cholera, symptoms of a rheumatic character are frequently noticed.

Symptoms.—The symptoms are quite marked. These are fever, loss of appetite, lameness, and a general lack of condition. Sometimes large swellings appear in the region of the hock, knee, and joints of the feet. If the muscles of the back are affected, the loins and back are held stiff and arched, the muscles are tender or sensitive when pressed on, and the animal may be unable to move the hind parts. The

latter cases may show a serious train of symptoms. Sows that have raised a litter of pigs, and are in poor flesh and debilitated, are sometimes affected in this way.

A lameness of one or more of the extremities, that shows a tendency to move about, is the only symptom noticed in the mild form of the disease. Stiffness in the gait is noticed, especially if the quarters are affected, and the hog lies around the pen a good share of the time and refuses to go far for its food.

In acute rheumatism the pain in the affected muscles and joints is intense, and when these parts are handled or the joints fixed, the animal will squeal. When lying down asleep, sudden contractions of the muscles may be noticed. This is due to the pain resulting from the relaxing of the muscles.

The disease may pursue a long course, the joints become greatly enlarged, and the hog grows very thin and weak. In such cases a complete recovery does not occur. Acute heart-disease is not an uncommon complication.

Treatment.—Preventive treatment is very important. It means the providing of dry, comfortable quarters, and the avoidance of exposure. Old straw stacks should not be used as a shelter for hogs, and the same is true of draughty, damp hog houses.

An important part of the treatment is to provide dry, warm, comfortable quarters for the sick animals. Unless this is practised, but little good can be gotten from the medicinal treatment. A sloppy diet is also indicated. Salicylate of soda is the most use-

ful drug to give in this disease. The dose is twenty or thirty grains in the feed, or as a drench, three times a day. Larger doses, and at more frequent intervals, may be given in acute cases for a short

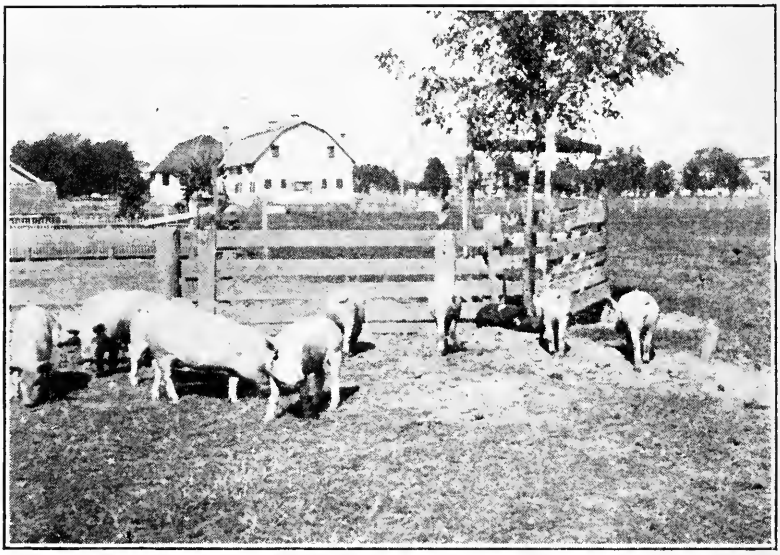


FIG. 10—A LITTER OF PIGS AFFECTED WITH RICKETS

time. Quinine and bitter tonics can also be given. Blistering ointments and liniments should be applied to the inflamed articulations.

RICKETS—RHACHITIS

Rickets is a disease affecting the bones, and, according to some writers on this disease, is most common in growing pigs shortly after they are weaned. In rickets, the bones of the body are lacking in mineral or earthy matter, and as a result lose their rigidity

and become deformed. This is especially true of the extremities.

Causes.—The most common cause of the disease is a faulty diet. In the Corn Belt, where corn forms the principal part of the ration fed growing hogs, rickets is not uncommon. Such a diet is deficient in inorganic matter, and unless supplemented by milk, pasture, or other feeds, the bones are not supplied with the necessary elements. Lack of exercise, crowded quarters, filth, etc., help in causing the disease. A tendency toward rickets in pigs is no doubt hereditary.

Symptoms.—The animal is usually fat at the beginning of the disease. Large, well-grown pigs may suddenly develop symptoms of paralysis of the hind parts. The weakened condition of the thigh-bones and the extra weight that they support causes their fracture, and the symptoms resulting resemble the above condition. At other times there is a weakness and bending of the bones in the extremities, breaking down upon the feet, bending or arching of the back, straddling gait, deformed or distorted condition of the face and snout. The latter condition is known as snuffles.

When the disease takes on a chronic form, or has progressed for some time, the pig becomes unthrifty and stunted. When a fracture of a principal bone in the extremity occurs, it is best to destroy the pig. Snuffles is another condition that does not respond to treatment.

Treatment.—Rickets can be prevented by feeding

a suitable ration, and keeping the hog in clean, well-ventilated quarters, where it can get plenty of exercise. Salt and charcoal are valuable additions to a growing pig's ration. Whenever a litter or several

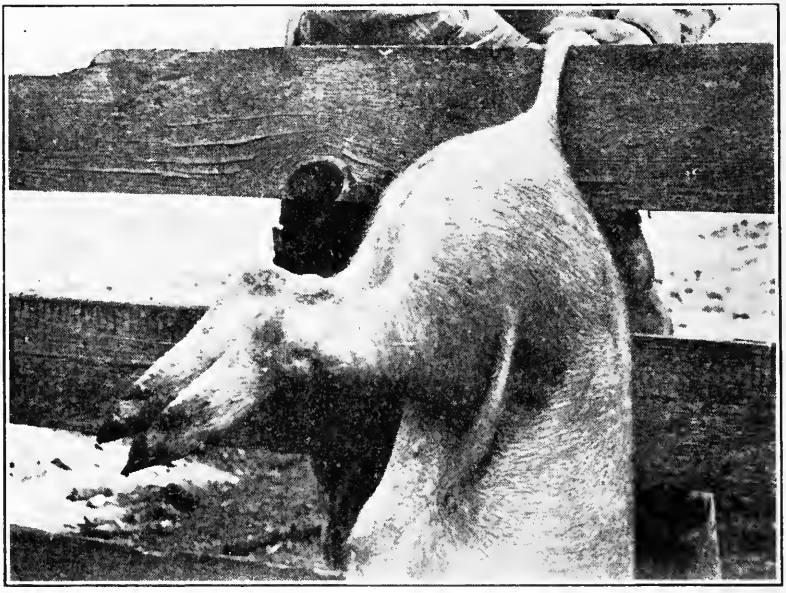


FIG. 11—RHACHITIC SWELLINGS ON THE HOCK JOINTS OF A PIG

individuals in the herd show symptoms of the disease, the character of the ration should be looked into, and, if faulty, corrected by adding to it food containing the required elements.

It is hardly practical to use medicinal treatment other than bitter tonics. Unless it is in advanced cases, the disease can be controlled by feeding a ration rich in inorganic substances, and good hygienic conditions.

SNUFFLES—BULLNOSE

Snuffles is an inflammatory disease of the lining membrane and the bony walls of the nasal cavity, accompanied by a distortion or deformity of the snout and face. This disease is frequently discussed along with rickets, and can be considered a symptom or complication of the latter disease. Some writers describe two forms of snuffles—a catarrhal and rhachitic. In the catarrhal form there is no noticeable change or deformity in the bones of the face, while in the rhachitic form these bones, as well as other parts of the skeleton, are deformed.

Causes.—This disease is produced by a primary inflammation of the mucous membrane lining the nasal cavities and a ration lacking in the necessary amount of earthy matter. Under such conditions rhachitis of the facial bones may occur. Some authors state, that the deformity of the face may occur as a result of the mucous membrane crowding the walls of the nasal cavities. We must not overlook the influence that a local inflammation may have in producing a malnutrition in a part, when the diet and surroundings are such as favor its production.

The causes of a catarrhal cold and rickets are discussed under their separate heads.

Symptoms.—The principal symptoms are noisy, difficult respirations, a nasal discharge, unthriftiness, and a deformity of the snout and face.

At the beginning of the disease the symptoms resemble those seen in nasal catarrh and sore throat. The discharge from the nostrils is continuous, and

when the pig lies down for a short time, accumulates in the nasal cavities and causes further obstruction. On getting up the animal blows the nose or coughs in order to clear the air passages, and at all times it makes a wheezing, snuffling sound when breathing. Bleeding at the nose occurs in advanced cases, usually when taking exercise.

Pigs affected with this disease have a dejected appearance, and lie around the pen and in out-of-the-way places more than common. The appetite is usually poor, and the animal may have trouble in eating and swallowing food. The hog appears unthrifty and stunted. The hair is rough and long, the skin dirty, condition poor, eyes watery, and the face, or some other part of the body, deformed.

The disease takes a long, chronic course. After it becomes well advanced, the hog cannot make a complete recovery. Death sometimes occurs within a few weeks after the first symptoms are noticed.

Treatment.—The treatment is preventive, and along the same line as in rickets and cold in the head. The curative measures indicated in these two diseases may also be used. However, it is not best to attempt treatment in a well-defined case. The cheaper and better method is to destroy the animal.

SORE FEET

Heavy hogs, when kept on hard floors or driven over rough roads, may suffer from bruised, inflamed feet. Hogs that are kept in filthy yards may also suffer from this disease. Under such conditions, the

tissue between the claws becomes softened by the moisture, and the germs present enter the tissues and set up an irritation.

Treatment.—If the sore feet result from confining the hogs on a hard floor, turning them out in a yard or pasture may effect a cure. If the pens and yards are filthy, the hogs should be changed to clean, dry pens. The medicinal treatment consists in washing the feet once a day with a four per cent. solution of some of the tar disinfectants until healed. A very effective wash for the feet can be made by mixing one teaspoonful of chloride of zinc with a pint of water. This mixture tends to harden the feet and destroy all germs.

Keeping the hog in a clean, dry place is very necessary in order to bring about a cure.

PART II

SURGICAL DISEASES

CHOKING

CHOKING is caused by swallowing some sharp object, such as a piece of bone, that penetrates the lining membrane of the gullet and becomes lodged in the part, or by such objects as potatoes, roots, etc., that are too large to pass along the canal and into the stomach. Paralysis of the œsophagus may also cause it.

Symptoms.—In complete choke, the hog is unable to swallow food, saliva dribbles from the mouth and bloating occurs. If not relieved, death occurs in a short time. The symptoms are not so serious in partial choke, difficulty in swallowing and salivation forming the main symptoms.

It is sometimes difficult to recognize a partial choke. In case the obstruction is lodged in the throat or anterior part of the gullet, it may be felt when the part is manipulated with the fingers. Instead of grunting the hog makes a shrill sound. The object may be gotten rid of by vomiting.

Treatment.—When the object is smooth and lodged in the throat, it may be forced forward and into the mouth by pressing below it with the fingers and shoving it forward. It may also be dislodged by introducing a blunt, flexible stick into the mouth and

gullet, changing the position of the obstruction and then working it forward. A blunt wire hook is sometimes used when the object is well forward. A mouth gag and a probang may be used when necessary.

Drenching the hog with oils or mucilagenous drinks (flaxseed tea, etc.) will lubricate the passages, and the object may slip on down the œsophagus and into the stomach. We must remember, however, that the animal is unable to handle a large drench, when in this condition, and give only a small amount at a time, or a part may get into the air passages and do a great deal of harm.

Unless the hog is relieved shortly after the accident occurs, it is best to slaughter it.

RUPTURE—HERNIA

Hernia or rupture is a condition in which a portion of the intestines, or omentum have passed through the walls of the abdomen and lie just beneath the skin.

Rupture in pigs is frequently due to some congenital defect, as an open umbilicus or a wide inguinal canal. At other times, it is caused by increased pressure on the walls of the abdomen by the intestines, due to the pigs piling up and lying on one another, and to crawling through a small opening in a fence.

The different forms of rupture are discussed separately.

UMBILICAL HERNIA

Umbilical hernia is usually congenital. At the time of birth, the umbilical or naval opening is so large that the naval chord does not completely fill it, and the omentum, or a portion of the intestines pass through and take a position immediately beneath the skin. The rupture is recognized by the presence of a swelling or enlargement on the under side of the belly and opposite the naval opening. The enlargement is soft and free from inflammation, and larger at one time than another. By laying the pig on its back and pressing downward on the swelling, its contents can be forced back through the opening at its base and into the abdominal cavity.

Pigs ruptured in this way do not thrive well, as a rule, and sometimes become badly stunted. This is especially apt to be the case when the swelling is large.

Treatment.—The treatment of umbilical hernia is not dfficuilt and is usually followed by good results. As in all other forms of rupture, surroundings that may cause this class of injuries should be avoided.

The treatment is surgical and as follows: The pig is placed on its back and held by the assistant. With the fingers, the size and position of the navel opening is determined, and if the intestines do not pass back into the abdominal cavity of their own accord, they must be forced back with the fingers. After getting rid of the contents of the sack, it is held by the assistant and a strong cord tied around its base close up to the opening into it. Within a short time the

cord causes the tissues to swell and close the opening. As the blood supply to the sack is cut off, the part sloughs away in a short time.

The simple ligature, as above described, answers very well for a small rupture, but in case the swelling is large a multiple ligature must be used. The procedure differs slightly when this is used. The sack and the skin in the region of the sack are first washed with a disinfectant. The instruments needed for the operation are a strong curved needle and a pair of scissors. The needle carrying the heavy linen thread or ligature that has been lying in the disinfectant solution, is passed through the base of the sack close to the belly, the thread is then divided and each half is tied separately, or, one half of the thread is cut close to the needle, and the needle carrying the other half again passed through the sack a short distance from the part included in the first ligature. This is repeated until the necessary number of stitches have been taken. The ends of the stitches are then tied. The assistant should pull slightly on the hernial sack, so as to enable the operator to place the stitches close to the opening.

In case of adhesions between the contents and wall of the sack, as may occur in hernia of long standing, it cannot be reduced in the usual way. In such cases, it is necessary to cut through the walls of the sack and break down the adhesions with the fingers. The opening is then closed by stitching across it from margain to margin. The parts and the instruments used in the operation must be carefully disinfected,

as there is danger of introducing germs into the abdominal cavity and causing the hog to die of peritonitis. The after treatment consists in keeping the pig in a separate pen, away from the other hogs, and washing the part once a day for a few days with a disinfectant in order to promote healing.

SCROTAL OR INGUINAL HERNIA

Scrotal hernia occurs in the male, the intestines passing through the wide inguinal canal together with the cord of the testicle and become lodged in the scrotum. It is not difficult to recognize this form of rupture, as the enlargement of the scrotum is usually quite noticeable. It is sometimes so large that it drags on the ground. These large ruptures occur when the inguinal canal is wide and roomy, and when both sides of the scrotum contain intestines or the rupture is a double one. The nature of the swelling or enlargement can be readily recognized by raising the hind parts of the pig, when the intestines will gravitate back into the abdominal cavity, but as soon as the pig regains its feet, they again return to the scrotum. The testicles can be felt toward the bottom of the enlargement.

This condition is more apt to occur when a large number of hogs are allowed to run together, if they crowd one another in narrow doorways and at the feed trough, or pile up in their sleeping quarters. The canal is so roomy and loose that it is uncommon for the intestines to become pressed on in such a way as to become strangulated. However, the thriftiness

of the animal is greatly interfered with and it may become badly stunted.

Treatment.—To relieve a scrotal hernia, it is necessary to castrate the hog. The pig should be starved for about a day, as it is easier to operate when the intestines are empty, or nearly so. In small pigs this is not so important.

What is known as the covered operation is to be preferred in most cases. The procedure is as follows: It is best to hang the pig up by the hind legs, or have the assistant hold it in this position in order to relieve the pressure on the scrotum and help in returning the intestines. A needle, ligature, operating knife or scalpel and scissors are the instruments necessary for the operation. These should be disinfected before beginning to operate and kept in a disinfectant when not in use. The scrotum is first washed and disinfected and an incision made in its walls. The incision should be made down to the covering of the testicle (tunica vaginalis). This must be done carefully so as to avoid cutting through the tunic. The opening in the scrotum must be plenty large enough to enable the operator to draw the testicle and its coverings outside the sack, and give him room to work. A needle carrying a ligature is passed through the cord and tunic as high up as possible, the needle removed and the parts ligated. The cord and its covering are then cut off about half an inch above the ligature. This completely closes the abdominal cavity and there is no chance for the hernia to again occur.

The open operation is sometimes performed. The rupture is reduced in the usual way. An incision is then made the same as in castration and the testicle removed. To close the inguinal canal, a number of stitches are taken across the external opening. In addition, the scrotum is sometimes packed with some sort of material and the incision closed with sutures. Precautions should be taken against germ infection. This operation is more difficult and less satisfactory than the covered operation.

VENTRAL HERNIA

Scrotal and umbilical hernias are due to the dilation of openings already present. All other forms caused by a break or tear in the abdominal walls, but not in the skin, are called ventral herniæ.

Ventral hernia is caused by injuries to and pressure on the abdominal walls. It may occur as a result of kicks and collisions with blunt objects. Tearing and stretching of the tissues may also occur when hogs crowd one another and pile up around straw stacks, and in their sleeping quarters. A weak, debilitated condition predisposes them to this class of injuries.

The appearance and character of the swelling is much the same as in other ruptures. The size varies greatly. When the injury is caused by a kick or collision, a local inflammation is present. As ventral hernia is commonly caused by crowding and squeezing, a common seat is on the inside of the flank, the swelling extending backward between the thighs and

resembles to some extent a scrotal rupture. In these cases the tear in the tissues is usually long and the swelling large and easily reduced.

Treatment.—The treatment is more difficult and less satisfactory than in other forms of rupture. In cases of long standing, it is not uncommon for the intestines to adhere to the hernial sack. This condition makes the reduction of the hernia difficult, and it is necessary to use care in cutting through the walls of the sack and in breaking down the adhesions in order to avoid injuring the intestines.

The hog is held in the best position possible for the reduction of the rupture, usually on its back with the hind parts elevated. The incision in the sack should be large, so as to give the operator room to work. If adhesions between the sack and the intestines are present, they should be carefully broken down and the intestines returned into the abdominal cavity. The edges of the tear or opening should be freshened by cutting, or scraping them with a scalpel in order to promote healing. The opening should then be closed with stitches, well placed and close together, so as to insure their holding and keeping the margins of the tear in apposition. Boric acid can be dusted over the part and the hernial sack packed with antiseptic gauze, and the incision in the sack closed by a few stitches. The packing must be changed daily and the part washed with disinfectants until healed. The stitches may then be removed. In operating the usual care against germ infection should be practiced. Keeping the hog quiet and in a clean pen is the necessary part of the treatment.

CASTRATION

The castration of the boar is a very simple operation and is not followed by complications when properly performed, as is frequently the case in some of the other farm animals. Pigs of all ages and in all kinds of condition are castrated. The age at which it is best to operate is not fully agreed upon, but a large number of swine breeders prefer to do this work when the pigs are still nursing, or wait until some time after they are weaned. However, they seem to suffer less from the operation before they are weaned than when older, and it is especially apt to check their growth, if done at weaning time.

The operation is frequently performed under very unfavorable conditions for healing to occur. It is too often made a rainy day job and the pigs are afterward turned into muddy, filthy pens. Such conditions as these favor the infection of the wound with injurious germs, and healing is interfered with by the formation of pus and the inflammation of the part. This is especially apt to occur during the warm weather.

It is unnecessary to prepare young pigs for the operation. If operated on after weaning time, they should be prepared by not allowing them food for at least twelve hours. The stomach and intestines are not distended with food, when prepared in this way, and the pigs are easier to handle. We should always handle young pigs carefully in order to avoid injuring them, or getting them warmed up. This latter

condition may increase the danger from bleeding, and is apt to give them a set back.

When everything is convenient and the pigs are confined in small pens where they can be easily caught, one assistant will be able to catch and hold the pigs for the operator. There are different methods of holding them. Usually, the hind limbs are grasped with the hands and the head and fore limbs are held between the knees. The pig is sometimes laid on its side or back, and the hind limbs are drawn well forward and held with the hands. Large hogs are sometimes very hard to hold, and it may be necessary to tie their limbs in order to prevent them from struggling and getting away. It is best to place a grown animal on its side, rest one knee on the side of the head and neck, and draw the hind limbs as far forward as possible.

The operator should provide himself with the necessary instruments, solutions, etc., before beginning to operate. He should have plenty of disinfectant (four per cent. water solution of a tar disinfectant) in a clean pail, a good castrating knife, needles, suture thread, and absorbent cotton or jute. The instruments can be kept clean by dropping them into the disinfectant wash when not in use. The skin of the scrotum should be first cleaned with the disinfectant. The testicle is then grasped between the thumb and finger and pushed against the wall of the pouch, an incision is made in the scrotum parallel with the middle line or raphe and from half an inch to an inch and a half to one side, the covering

of the testicle incised and the testicle removed. The incision should be large enough to allow the testicle to drop out, and made with one stroke of the knife. When the hog is on his side, the lower testicle should be removed first. In young pigs the cord is usually severed by giving the testicle a quick jerk, but in older animals it is best to pull the cord well out and sever it by scraping with the edge of the knife. Other methods of severing the cord are tying a ligature around it before cutting it off and using the emasculator—an instrument that crushes as well as cuts the tissues. These latter methods are practical in grown animals and when the cord is large. However, the emasculator can be used to an advantage in all cases. The operation is then repeated on the opposite side.

Before letting the pig loose, the incisions in the scrotum should be examined, and if they do not extend to the lowest part of the pouch, should be made longer. This allows the blood and pus to drain off, instead of collecting in the part. Some precautions should be taken for a few days against the wound becoming dirty. The pigs should not be allowed to wallow in the mud and sleep in dirty, dusty places. If the conditions are favorable, the wound will heal rapidly and require no after treatment.

The belief that it is unnecessary to take the above precautions is only too common. It is because of this and the careless way in which the operation is performed, that complications so frequently follow.

COMPLICATIONS FOLLOWING CASTRATION

Castration of the male is not free from complications. These are hemorrhage from the blood vessels in the cord, rupture, abscesses and fibrous tumors. Peritonitis seldom occurs from this cause.

Hemorrhage is not a dangerous complication in young hogs, as the blood vessels in the cord are so small that they soon become closed by a clot. There may be considerable bleeding from the incision in the scrotum, if the pigs become warmed up in catching them, but this is never dangerous. In old hogs the blood vessels in the cord are larger, and a serious hemorrhage may occur if the cut ends of the vessels are not crushed sufficiently to close them and hasten the formation of a clot. As well as endangering the animal's life, bleeding may weaken and check the growth of the pig.

Bleeding from the cord can be stopped best by taking up the stump end and ligating it. Another method is to pack the scrotum with absorbent cotton and sew up the incision in its walls. The cotton should not be removed for about twenty-four hours, as it takes fully this long for a clot to form and the danger from bleeding to be over.

Hernia rarely occurs as a complication of castration. When it does, it is due to a roomy inguinal canal, or to injuring the animal while handling it. The operator should be prepared to meet this condition whether it occurs as a result of castration, or is present at the time the operation is performed. The

methods of relieving this condition are described under the head of scrotal and ventral herniæ.

Growths or tumor formations in the scrotum and at the end of the cord are common when castration is not properly performed. A common mistake made by the operator is to cut too small an opening in the scrotum. This does not permit the pus and other secretions to drain off, and the parts become inflamed. Other causes are leaving the cord too long and infection with irritating germs. Tumors in this region can be considered a serious complication, as they interfere with growth and may cause the death of the pig. They can be largely prevented by avoiding the above causes and seldom occur when the castration is performed properly.

The treatment consists in dissecting out the tumor. This is a very painful operation and the pig may die shortly after the tumor has been removed, especially if the growth is large. However, the results are usually good when the operation is skillfully performed, or if the tumor is small. In all cases, if not completely removed, it is apt to grow again and give more trouble than at first.

CASTRATION OR CRYPTORCHIDS OR "ORIGINALS"

In the "original" pig, the testicles, one or both, fail to descend through the inguinal canal and make their appearance in the scrotum. Usually, but one testicle does not descend into the scrotum and it may

be found in any part of the abdominal cavity, but in most cases is situated in the region of the flank. "Originals" are the cause of a great deal of annoyance in the hog lot, and unless they are castrated, should be taken out of the herd and disposed of in some way. Their castration is more difficult than that of the "straight" pig, but is not as difficult or dangerous as is commonly believed, and in most cases the operation is very successful.

The method of operating is as follows: The hog should be starved for at least twelve hours. The operator's hands must be clean, and the disinfectant solution and instruments are gotten ready the same as in castrating a "straight" pig. The animal is laid on its side on the floor, or a table, and held there by the assistant. The operator stands at the back and clips the hair from the flank. An incision is then made in the flank, well toward the upper part and midway between the last rib and the point of the haunch. The incision should be large enough to permit two or more fingers to enter the abdominal cavity, and, if necessary, may be enlarged so as to admit the hand. On finding the testicle, it is drawn through the incision and the cord cut off in the usual manner.

It is always best to use an emasculator, or ligate the cord before cutting it off, if the hog is well grown. After the testicle has been removed, the incision is closed by a number of stitches in the skin about an inch apart. The after treatment consists in keeping the wound clean for a few days and remov-

ing the stitches in about a week. In case the "ridgling" is a double one, the operation is repeated on the opposite side.

SPAYING—OVARIOTOMY

The spaying of the sow is not practiced as extensively at present as it was ten or twenty years ago. Of late years the operation has been made unnecessary by the marketing of the sow at the age of six or eight months, unless it is in special cases. We occasionally come across a person who still believes in the practice of spaying, but the large majority of swine breeders consider it of no value.

The proper age to spay is when the sow is three or four months old, as at this age she is not sufficiently developed to take the boar, is easily handled and but little inconvenienced by the operation. The sow should be prepared for the operation by not feeding her for about twelve hours, or long enough to partially empty the intestines so that they will not interfere with the operation.

The flank operation is to be preferred to the one on the median line, and the procedure is very much the same as in castrating an "original." The sow is laid on an inclined board or table, the hind parts more elevated than the foreparts, and held by the assistant. The operator should supply himself with the necessary instruments and material, such as operating knife, scissors, needles, suture thread, disinfectant, etc. A special shaped knife is recommended for making the incision in the flank, but an

ordinary castrating knife or bistoury will answer the purpose. Linen thread may be used for suture material, and a strong half-curved surgeon's needle is best for sewing up the incision in the flank. A small bitch emasculator is to be preferred for cutting off the ovaries. The instruments should be kept in the disinfectant solution when not in use. The operator's hands must be clean and the seat of the operation washed with the solution.

The operator stands at the back of the sow. The hair is first clipped from the skin at the point where the incision is made, high up in the flank and midway between the point of the haunch and the last rib. The incision in the part should be large enough to admit two fingers, and in the same direction as the long axis of the body, or across it. The latter direction is to be preferred. After tearing through the peritoneum, one or two fingers are introduced into the abdominal cavity and directed toward the back. If the ovaries are not easily located, the womb should be located and followed forward until the fingers come in contact with the ovaries. These organs can be readily recognized by the way they feel—firm and rough. The ovary is then pulled through the opening in the flank and removed by tearing it off with the fingers, or better, by cutting it off with an emasculator. The flank incision is then closed by the necessary number of stitches.

Both ovaries may be removed through the same opening, or the operation repeated on the opposite side.

When the operation is performed on the median line, a small rope is tied around each hock and the sow hung up with a gambrel. A small incision is then made on the middle line of the abdomen, two or three inches in front of the pubis. The ovaries are then removed in the usual way, and the incision closed by the necessary number of stitches.

PROLAPSE OF THE ANUS

Permanent protrusion of the lining membrane of the rectum through the anal opening is called a prolapse of the anus. This condition is not uncommon in growing pigs. Pigs having access to cinder piles, soft coal, etc., frequently suffer from this ailment. It is also common in pigs that eat rotten wood and earth. Constipation, diarrhœa, or any condition that may bring about a weakened condition of the spincter muscle of the anus will cause it.

Symptoms.—In some cases only a small portion of the rectal mucous membrane makes its appearance outside of the anus. In more severe cases a fair-sized tumor, round, red, and slightly painful, is present. After being exposed for a time, it becomes swollen and dark colored, and, finally, dried and cracked on its surface. The prolapsed part may itch intensely, and the hog rubs and injures the tissues in trying to relieve the irritation. Usually the appetite falls off and the pig is rest-

less. If not relieved, the prolapsed part sloughs off in time.

Treatment.—The preventive measures consist in correcting at the proper time such disorders as may cause the disease.

When the pig is constipated, as is usually the case, it should be given a laxative and fed a sloppy diet. The rectal mucous membrane should be bathed with warm water until cleaned, and the irritation relieved before replacing it. If badly swollen and inflamed, an astringent wash (a five per cent. water solution of powdered alum) should be used. It can then be returned by pressing it within the anal opening with the fingers. If necessary, a stitch can be taken across the anal opening to retain the prolapsed part. In case the tissues show indication of sloughing, they should be cut off and the cut edge of the mucous membrane sutured to the margin of the anus.

PART III

INFECTIOUS DISEASES

HOG CHOLERA

Hog Cholera is a common infectious disease of swine, characterized by an inflammation and ulceration of the stomach and intestines, enlarged and inflamed condition of the lymphatic glands, and sloughing of portions of the skin. The name hog cholera is frequently applied to a class of infectious diseases in which the symptoms resemble each other. The investigation carried on by the Bureau of Animal Industry show that there are three diseases belonging to this class: hog cholera and swine plague, with which swine breeders are well acquainted, and a third that resembles the acute form of hog cholera.

The annual loss from the so-called hog cholera epidemics has been estimated at from $10,000,000 to $25,000,000, and in some years investigators have estimated the loss at double the latter amount. In the Twentieth Annual Report of the Bureau of Animal Industry, the per cent. of loss from disease in the different farm animals is given for the year ending in March, 1904. The per cent. of loss in hogs is about twice that of other animals, due no doubt to epidemic infectious diseases.

History.—Most writers believe that hog cholera was first introducted into the United States through

the importation of diseased animals from England, the same as in a number of other animal diseases. The early history of the disease in this country is not very definite.

The first supposed outbreak of hog cholera occurred in Ohio in 1838. During the next ten or fifteen years scattering outbreaks occurred in the states bordering on Ohio and in the South. During the next period in the history of this disease, from 1845 to 1860, it became thoroughly planted in all parts of the country, where hog raising was followed to any great extent, through the movement of animals from one part of the country to another.

Although its importance and contagious character were recognized at an early period, no effort was made to prevent it from spreading. At that time veterinarians and stockmen were not acquainted with the nature of the contagion, and the modern methods of dealing with such diseases, and the opportunity to stamp out hog cholera at a time when it might have been successfully controlled, was lost.

Causes.—The specific cause is the bacillus of hog cholera, discovered and described by the Bureau of Animal Industry in 1885. It is a small rod-shaped germ having rounded ends and from .00005 to .00006 of an inch in length and .0000028 of an inch in breadth. It is usually present in large numbers in the blood and diseased tissues of an animal that has died of the disease.

The germ is motile and grows readily in the laboratory on the different kinds of nutrient media, especially in alkaline ones kept at the body temperature. It grows in the presence or absence of oxygen and does not form spores. It does not liquefy gelatine or produce any specific odor.

Accessory Causes.—The wide prevalence of this disease can be acounted for by the unhygenic conditions existing in the hog houses and their surroundings. Filthy hog houses and yards are the usual centers of infection in a community, and when the germs become planted among such surroundings they may live for several months and remain active or virulent.

Experiments conducted in order to determine how the germs find their way into the body, show that they usually enter by way of the digestive tract, along with the food and water; hence unsanitary surroundings play an important part in the spreading of the disease. Overcrowded hog houses and muddy yards are favorable conditions for infection. Feeding the hogs in the mud or on filthy feeding floors, and watering them in dirty troughs, or from ponds and streams, are common sources of the disease.

Hog cholera is frequently spread by exhibiting hogs at stock shows and fairs where they may have an oportunity to come in contact with the germs of the disease in the pens, or when shipped in stock or express cars. Buying hogs from diseased herds is also a common source of contagion.

When an outbreak occurs in a neighborhood, precautions against the spread of the disease to neighboring herds are not taken, and it becomes distributed about by people, dogs, and other farm animals, birds, etc. Swine breeders, as a rule, do not recognize the danger of carrying the germs in the mud and filth that may accumulate on the shoes of a person who has walked through yards where hogs are dying of hog cholera. Dogs, horses, cattle and wagons may act as carriers of the germ in the same manner. Pigeons, because of their habit of feeding in the hog lots in different parts of the neighborhood, are also carriers of the germ. The opportunity for crows, buzzards and dogs to distribute the disease is not great in sections of the country where the carcasses of the dead hogs are disposed of by burning or burying.

The drainage from infected yards is a dangerous source of infection. Streams running through an infected district may distribute the disease to all hog lots bordering on its banks. If the hogs' water supply comes from such a source, or the animals allowed to wallow in the stream, disease is almost sure to occur.

Age is an important predisposing factor in young hogs, and may be greatly increased by crowding them into too close quarters and by feeding an unsuitable ration. The feeding of a one-sided ration of corn does not meet the needs of the system in growing animals, and they soon

lose their vigor and may show unthriftiness. This is no doubt one cause for the disease being so prevalent in the corn-belt.

Period of Incubation.—The shortest period of incubation is two days, the longest three or four weeks. This depends on the susceptibility of the animals, the activity of the germ and the manner

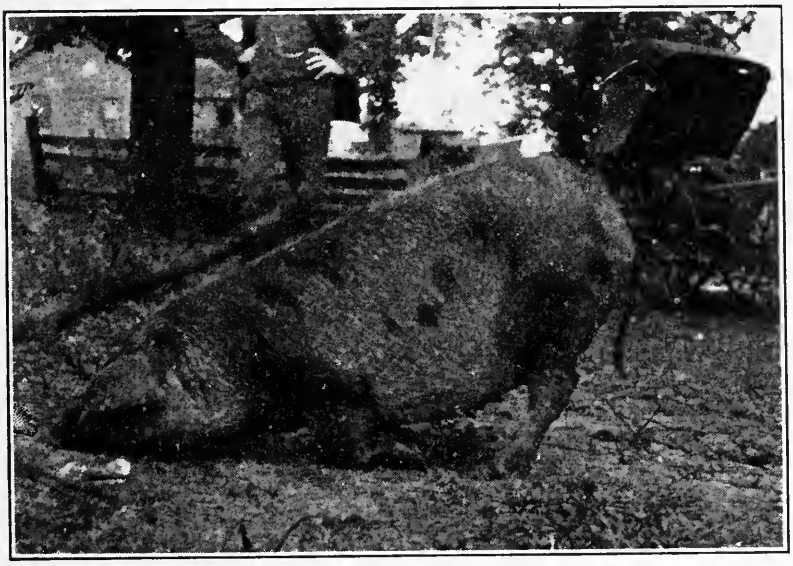


FIG. 12—A COLERA HOG

of infection. An acute attack indicates a short period and a mild or chronic one a long period. Usually, from one to two weeks will elapse from the time the animal is exposed until it comes down with the disease.

Symptoms.—Three different forms of hog cholera occur, and for this reason the disease does not

present a specific set of symptoms. The symptoms can be divided into acute, subacute and chronic.

In the **acute form,** which is the most common, an elevation in the body temperature of from one to three degrees, marked depression and loss of appetite are among the first symptoms. Vomiting may also occur. In some cases there is an inclination to eat earth and other indigestible sub-

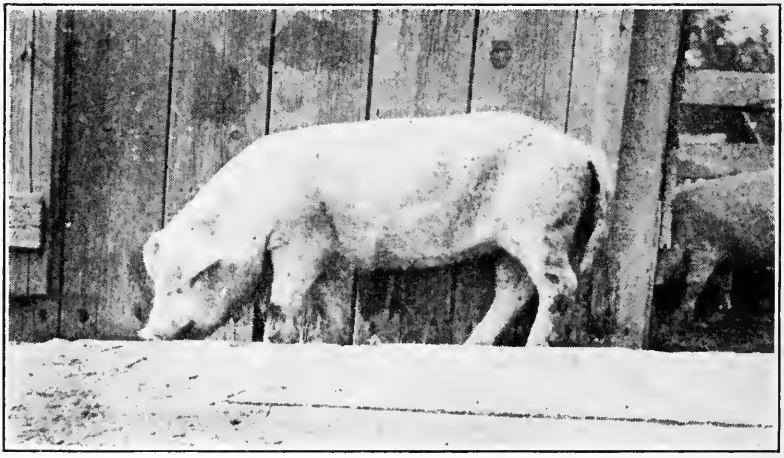


FIG. 13—A CHOLERA PIG

stances. Usually, the hog goes off by itself and hunts a cool, quiet place and lies down, or burrows under the litter and hides. Tremors suggestive of a chilling of the body may be noticed. The inflammation of the intestines and soreness of the abdominal walls cause the hog to arch the back, carry the hind parts stiffly, stagger, and cross the hind feet when it moves about.

As in all serious febrile disturbances, the secretion from the lining membrane of the eyelids is increased. At first the secretion is watery, but soon becomes heavy and pus-like. It accumulates on the margins of the lids, causing them to adhere together. There is also an increase in the skin secretions. These become mixed with the dirt and dust, which adheres to the surface of the skin and gives the animal a dirty appearance. Red, hemorrhagic spots or blotches may appear on the skin in the region of the ears, on the under side of the neck and abdomen, and other parts of the body, but unless the skin is light colored, this symptom is not very prominent. Similar spots may be seen on the lips and the lining membrane of the mouth.

Early in the attack constipation occurs and later a diarrhœa, or a diarrhœa and constipation may alternate. The diarrhœal discharge is thin and watery, has a fœtid odor, and is usually dark colored or black. Sometimes it is mixed with blood. However, the color of the feces depends somewhat on the kind of feed the animal has eaten, and if fed mostly on corn, the evacuations are light colored.

The respiration and pulse beats are quickened. Thumps sometimes occur. When the throat is swollen and inflamed, the respirations are labored and noisy. The symptoms advance rapidly. The hog becomes very weak and depressed in the latter stages of the disease, and is usually found dead in its bed. The duration of the acute form is from two days to two weeks. In some cases death

occurs without our noticing previous symptoms of disease.

The usual termination is death, especially in pigs. It may, however, assume the chronic form.

In the **subacute form,** the symptoms may be so mild as to escape notice. A mild train of symptoms, similar to those described in connection with the acute form, usually occur. These are a feverish condition, depression, loss of appetite, constipation and diarrhœa. Recovery usually occurs within a few days. It may take on a chronic form.

When the disease persists for some time (from three weeks to three months) it is spoken of as **chronic.** In such cases the appetite is irregular and the animal becomes weak and unthrifty. The stomach, intestines and other internal organs are diseased and the symptoms manifested will vary, but are usually the same as in any general diseased conditions of the body. Young hogs become badly stunted.

The inflamed, hemorrhagic blotches on the skin become dry, hard and cracked, and soon separate from the healthy tissue and slough off. Large sores may form on the back and other parts of the body. These generally heal as soon as the other symptoms are relieved. The unthrifty appearance of the animal is greatly increased by the thickened, wrinkled and dirty skin, and the thin, dry coat. The loss of the tail and portions of the ears add greatly to the changed appearance. Pigs

may become so stunted and diseased that it is best to destroy them. Death often occurs.

Lesions.—The diseased changes in the tissues depend on the character of the symptoms and the duration of the disease.

In acute cases of only a few days' duration, hemorrhagic lesions predominate. The lymphatic glands, especially those in the region of the intestines, are a deep red color and infiltrated with blood. The spleen may also be engorged with blood and softened. Small, red, hemorrhagic spots may be present in the kidneys, heart and other internal organs, and the lining membrane of the thoracic and abdominal cavities may show hemorrhagic areas. Inflamed reddened areas on the lining membrane of the stomach and intestines form a constant lesion of disease. Sometimes, these hemorrhages into the tissue beneath the mucous membrane are so great as to raise it and give it a thickened appearance. Lesions of the same character may appear in the skin and underlying tissues, and in light-skinned hogs these blotches are very noticeable and become more prominent after death. They are so characteristic that meat inspectors can identify the carcass of a hog having had hog cholera, when hanging upon the gambrel in the abattoir.

The above leisons are caused by the hog cholera bacilli accumulating in the capillary blood vessels, plugging them and shutting off the circulation of blood in the part. The involved parts soon lose

their vitality and slough off. Raised ulcers follow the sloughing in the stomach and intestines. These are among the most characteristic lesions of the disease and may involve a large part of the lining membrane of the small intestine, resembling in appearance a croupous membrane. The ulcers may be confined to the last of the small intestine, and the beginning of the large (region of the ileo-cecal valve). The small ulcers are circular in outline, margins irregular and slightly depressed below the surface of the mucous membrane, and brownish, yellowish, or reddish in color. After a few weeks they show evidence of healing and the part is more or less filled in with scar tissue.

The liver and kidneys may show indications of having undergone degenerative changes.

The lungs may be involved secondarily and show scattered, inflamed pneumonic centers. However, this is not a constant lesion, and when the lungs are diseased to any great extent, it indicates the presence of the germ of swine plague.

Preventive Treatment.—Preventive measures consist in using all possible precaution against the carrying of the germs of the disease into the hog lots, the use of healthful, sanitary hog houses and surroundings, and in keeping the herd in a healthy, vigorous condition.

Hogs from other herds should be excluded from the hog lots until we are positive they are not diseased. Such animals should be quarantined in

FIG. 14—A PIECE OF INTESTINE SHOWING HOG CHOLERA ULCERS

yards set off for this purpose, and that do not in any way communicate with the regular yards. They should also be dipped or washed with a tar disinfectant. This latter precaution is necessary because of the possibility of the hogs carrying the germs on their bodies in the dirt and dust coming from infected places. The quarantine period should be somewhat longer than the average period of incubation. Three weeks is as long a time as necessary.

The possible introduction of the disease into the pens by people, dogs, birds, etc., should be guarded against, especially if the disease is present in the neighborhood. The distribution of the germs of hog cholera by these agents is not as common or as greatly to be feared, as a few years ago, when the nature of the contagion was not well understood, and people were allowed to enter the yards and carry away enough of the infectious material on their shoes to infect other places. Whenever it is necessary to enter a hog lot where the disease is known to exist, the shoes should be cleaned and disinfected on leaving it. Persons taking care of the sick animals should practice all precautions possible against the distribution of the disease, and see that others observe like precautions. The burial of the dead animals has greatly diminished the danger of spreading the disease by dogs and buzzards, but crows, pigeons and sparrows are still to be considered carriers of the infectious material.

In no place on the farm are disinfectants so necessary, as around the hog house and yards. Whitewash and lime should be used around the hog houses at least once a year. An occasional spraying of the feeding floors, pens, etc., with a disinfectant will help in keeping away undesirable germs. The tar disinfectants are the most convenient and useful for this purpose, and should be used in from two to four per cent. solutions.

Pastures and lots can be kept in a better sanitary condition, if the hogs are taken out for a few months each year. The unused lots can be put to a good use and cleaned up, by plowing and sowing them to some forage crop.

All possible precautions against the food and drinking water becoming infected with germs should be taken. The importance of clean water, clean feed, and clean troughs and feeding floors must be emphasized, as it is in the feed that the germs usually enter the system. Muddy yards are always undesirable, and when in use for a few years, are apt to become filthy. For this reason they should be well drained and all wallow holes filled in. Pens and pastures through which the drainage from swine enclosures higher up runs, should not be used for hogs.

An occasional spraying or dipping of the hogs with a one or two per cent. water solution of a tar disinfectant, can be considered a necessary part of their care. Pigs should not be placed in crowded quarters, and attention should be given their feed-

ing and care in order to keep them in a healthy, growing condition. Healthy individuals possess a certain amount of resistance toward disease, and this form of immunity plays no small part in the prevention of hog cholera. However, immunity from this source is limited, and when an animal in the best of health is exposed to a large number of active germs at any one time, disease is produced. This fact shows the importance of clean yards and the relation that other sanitary measures have to good health in the prevention of disease.

Hygenic Measures Necessary in the Treatment of Hog Cholera.—It is very necessary that we recognize the disease in the early stages in order to prevent its spread. In some outbreaks, the symptoms are not typical at the beginning of the outbreak and a diagnosis cannot be made from the symptoms alone. When such is the case, a sick hog should be destroyed and a careful post mortem examination made, and if it proves to be cholera, active measures should be taken against its spreading. If practical under the conditions, the herd should be divided into small bunches, and the sick animals separated from the well ones. If the pens and hog houses are in such a condition that they cannot be properly cleaned and disinfected, the herd should be moved to some convenient place and temporary quarters built. When the weather is warm, the only protection necessary is shade. In cold weather, the quarters should be warm enough to keep the hogs from piling up and catch-

ing cold. Portable hog houses are very useful for this purpose. The old yards should be plowed and all litter about the house and yards burned.

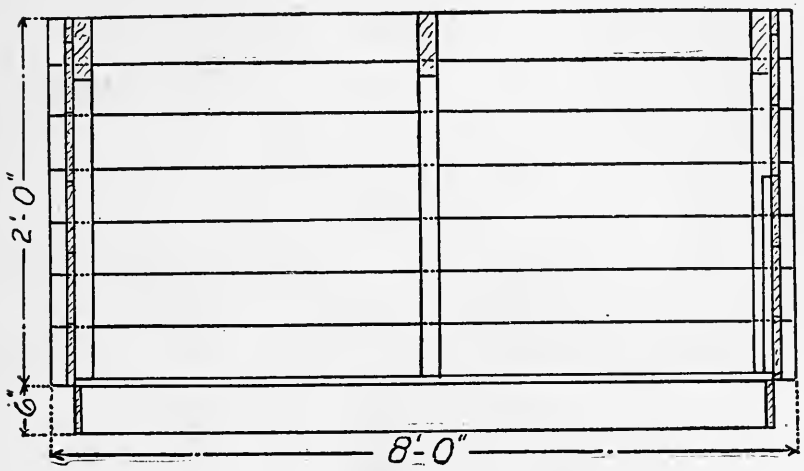
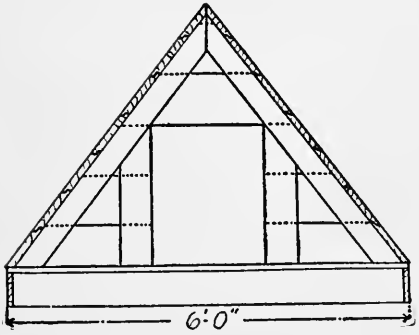


FIG. 15—LONGITUDINAL SECTION



CROSS SECTION

SPECIFICATIONS FOR LUMBER FOR PORTABLE HOG HOUSE

2 — 2″ × 4″ × 16′.		
2 — 1″ × 9″ × 16′.		
2 — 1″ × 6″ × 16′.		Pine.
2 — 1″ × 6″ × 12′.		
7 — 1″ × 9″ × 16′.		

PLAN FOR GOODELL PORTABLE HOG HOUSE

The yards, feeding floors, troughs and hog houses must be kept clean. All litter should be removed daily, and the frequent spraying of the

hogs, feeding floors, sleeping quarters, etc., with a disinfectant is a necessary part of the treatment. Lime is one of the most useful of disinfectants, and in whitewashing the rough, uneven surfaces about the hog houses, it is best to use a spray pump. The tar disinfectants should be relied on in destroying or retarding the development of the germs about the feed troughs, floors, etc., and should be used in from two to four per cent. solutions. Other agents can be used for this purpose, but the two mentioned are the most practical and useful.

Both the sick and well hogs should be fed a light, sloppy diet (shorts, bran, etc.). The water and slop must not be left in the troughs for the hogs to wallow in. Copper sulphate dissolved in the slop and drinking-water in the proportion of four or five ounces to the barrel may lessen the chance for infection through the food supply.

As soon as a hog comes down with the disease, it should be removed to the pens set off for the sick animals. These should not communicate in any way with the pens where the well hogs are kept.

The dead hogs should be burned. This is not a difficult task, if the body is placed on top of a pile of wood that burns quickly and makes a hot fire. If disposed of by burying, it should be well done and the body covered with lime. However, this is not as satisfactory as burning.

The length of time that the hog houses and yards remain infected after the hogs have stopped

dying, depends on the thoroughness with which they are cleaned and disinfected. If the litter and filth are not removed, the germs may live for months. All litter about the yards must be burned or removed to some place where the hogs cannot come in contact with it, and whitewash and disinfectants used freely. If the cleaning and disinfecting is properly done, fresh hogs may be brought onto the premises within a few weeks after the disease has been checked without further loss occurring, but it is usually best to wait two or three months before stocking up again, or depend on the hogs that have survived the disease for a fresh start, as there is some danger of a second outbreak and the infection continuing for a longer time. Where it is practical, the hogs should be moved to another part of the farm and new and better yards built.

Serum-Therapy and Vaccination.—For a number of years, the Bureau of Animal Industry have been experimenting with an anti-hog-cholera serum and a vaccine, but satisfactory results from this line of treatment have not been reported. In the Twentieth Annual Report, Dr. Salmon states that this line of experimental work will be continued, and at some time in the near future a full report of the work of investigation will be issued.

There are several companies in this country manufacturing so-called vaccines and antitoxins. The commercial antitoxins are said to contain no live hog cholera germs. Such preparations can be

classed with the so-called hog cholera remedies. The preparation of the vaccine and its administration are termed "methods." The conditions under which these so-called methods are used, are favorable for the infection of the yards with hog cholera germs and the spread of the disease to other herds in the neighborhood. Vaccination against hog cholera, as it is now used, is not practical, and more improved and careful methods of handling a vaccine of this nature must be used before this line of treatment should be considered.

Medicinal Treatment.—The medicinal treatment of hog cholera has always been unsatisfactory. The only good results that seem to have come from the so-called "remedies" and "cures" were due to the dieting of both the sick and well hogs, and the cleaning and disinfecting of the surroundings. Vast sums of money have been spent for hog cholera medicine, but stockmen seem to have determined the true value of this line of treatment and have almost discarded it. There are a few remedies still on the market, but the most of them are recommended for other purposes than the cure of this disease.

At present the statement that there is no satisfactory medicinal treatment, vaccine, antitoxin, or serum for hog cholera is true. Therefore, if hog cholera is to be treated, it should be along the line of prevention and sanitation—lines of treatment that are effective in all infectious diseases belonging to this class.

A DISEASE RESEMBLING HOG CHOLERA

In Circulars Nos. 41 and 43 of the Bureau of Animal Industry is published the description of a disease that cannot be distinguished by its symptoms alone from hog cholera.

During the course of the investigations concerning hog cholera by de Schweintz and Dorset, certain outbreaks were met with, which were apparently not produced by the germs of hog cholera and swine plague. This fact, together with their observations of the wide variations in the symptoms and lesions encountered in the different hog cholera outbreaks, led them to institute experiments in order to determine whether or no other diseases than hog cholera and swine plague were present in the so-caled "hog cholera" outbreaks.

Causes.—The specific cause of this disease has not been determined. The experimental work has shown that the disease can be readily communicated to healthy pigs by exposing them to diseased animals in the usual way. It is apparently, a highly contagious disease. The time between the exposure and development of the symptoms is about the same as in the acute form of hog cholera. In fact, the results of the late investigations by the Bureau of Animal Industry indicate that the acute form of hog cholera is not caused by the hog cholera bacillus, but by the germ of this disease.

Symptoms and Lesions.—The symptoms and post mortem lesions are so similar to the acute

form of hog cholera that is unnecessary to repeat the description of them.

Treatment.—The treatment is along the line of prevention and sanitation, the same as in hog cholera.

SWINE PLAGUE

Swine plague is an infectious disease of swine frequently associated with hog cholera. In some outbreaks it appears as a septicæmia or blood poisoning, but more often as a pneumonia or an inflammation of the lungs and pleural membrane, which lines the chest cavity and covers the lungs.

History.—It was not until the summer of 1886 that swine plague was identified as a distinct disease. Prior to this time all outbreaks of infectious swine diseases were supposed to be due to the germ of hog cholera. Dr. Theobald Smith was the first to investigate swine plague and isolate the specific cause of the disease. He proved beyond all doubt the disease-producing properties of the germ by inoculating rabbits and hogs with pure cultures obtained from outbreaks of swine plague. He found it identical with the germ described by Loeffler, which produced an infectious pneumonia (schweineseuche) of hogs in Germany.

A few investigators, especially Dr. Billings, did not agree with the results obtained by Smith, and a long controversy among the veterinarians in the United States, as to whether swine plague existed

as a distinct disease, occurred. This controversy occupies a prominent place in the history of the disease.

Causes.—The specific cause is the bacillus of swine plague, a small rod or oval shaped germ. When taken from the diseased tissues, it is about .00004 of an inch in length and .000024 of an inch in breadth, but in the laboratory when cultivated on the different kinds of media and under different conditions, its appearance varies and it may grow to twice the above dimensions.

The germ is non-motile and does not grow readily, or not at all, on some of the common nutrient medias, such as potato and gelatine. It grows in the presence of oxygen and cultures possess a disagreeable odor. It is not as hardy as the hog cholera germ, and if the conditions are not favorable for its growth, it soon dies. It is readily destroyed by drying and disinfectants.

Accessory Causes.—Attenuated or weakened varieties of the swine plague germ are frequently found in the air passages of healthy hogs. For this reason, the germ is widely distributed, but unless the animal is debilitated, or the activity of the germ increased in some way, it does not produce disease. A frequent method of infection occurs through susceptible animals coming in contact with swine having a mild form of the disease. Isolated cases of swine plague are more or less common, but there is always danger of its spreading rapidly under favorable conditions. Its dis-

tribution depends to some extent on the same conditions as those mentioned in connection with the hog cholera germ.

People, dogs, and birds are not important agents in the distribution of the disease, and it does not seem to spread readily through the food supply and as a result of filth. Buying hogs from infected herds and exposure to the disease at stock shows and fairs are, perhaps, the most common method of distributing the disease. Wind and dust are common carriers of the swine plague germ, and during dry, windy weather in the fall of the year, swine plague may spread rapidly among the hogs in a neighborhood and exist as a distinct disease. Irritation to the lungs from dust and lung worms seem to act indirectly in causing it.

Period of Incubation.—The time that elapses between the exposure and appearance of the symptoms is shorter than in hog cholera. If the swine plague germs are active, they multiply very rapidly in the system and produce disease in a short time.

Symptoms.—In the large majority of cases, there is no noticeable difference between the symptoms of hog cholera and swine plague. It is only when the lungs are extensively inflamed, that the stockman, or veterinarian is able to differentiate between the two diseases by studying the symptoms alone. The recognition of swine plague is based largely on such symptoms as coughing, and labored, painful, and oppressed breathing,

while in hog cholera it is based largely on the intestinal symptoms.

In the **acute form**, the hog is depressed, dull and feverish. The body temperature is very high (106° to 109°). The skin appears flushed, the animal is weak and staggers when it walks, and the breathing is heavy. The hog is usually seen lying down, may be unable to get on its feet, and acts stupid and sleepy. This sleepy, comatose condition may end in death, or death occurs in a convulsion. The course of the disease is from one day to a week.

The **chronic form** shows a more characteristic train of symptoms. At the beginning the hog may behave the same as in the acute form. Usually the symptoms are not nearly as severe. The appetite is impaired, the body temperature elevated, the back arched, abdomen tucked up and the flanks hollow. The animal behaves in a dull, stupid manner and shows symptoms of a serious respiratory disease, such as labored, difficult breathing and coughing. If the sides of the chest are pressed on, it causes the animal severe pain. Friction sounds may be heard on placing the ear against the chest walls.

The bowels usually become constipated and the hog loses flesh very rapidly, and finally becomes so weak that it is unable to get on its feet and walk. In the latter stages it may be seen lying on its side in a stupor, and when moved will squeal and show other symptoms of pain. The

reddened condition of the skin and visible mucous membranes is very noticeable.

In most outbreaks of swine plague, a smaller per cent. of the herd becomes affected than in hog cholera. Recovery seldom occurs. The disease frequently takes on the chronic form.

Lesions.—The lung and pleural lesions predominate. The inflammation of the lungs is limited to certain lobules, unless it is in the very acute cases. The lining membrane of the bronchial tubes is inflamed and the smaller tubules are filled with inflammatory exudates. Not over one-fourth of the lung tissue may be diseased. All stages of pneumonia may be present. On cutting across the lung, the section usually appears mottled with grayish red and reddish yellow areas.

Inflammation of the pleura is a very constant lesion. The membrane covering the lungs may be reddened, thickened and adherent to the chest walls. Other parts may present the same appearance. False membranes sometimes form and give the pleura a roughened appearance. In some cases it is greatly changed. The sack surrounding the heart (pericardium) is diseased in very much the same way as the pleural membrane.

The mucous membrane of the stomach and intestines is reddened, congested and inflamed in the majority of hogs that die of swine plague. In some cases ulceration occurs. The ulcers differ somewhat from the hog cholera ulcers in that they

are more excavated and less elevated and button like. The peritoneum is frequently inflamed.

Preventive Treatment.—The preventive measures in swine plague are along somewhat the same lines as in hog cholera. However, the most dangerous source of infection is from animals coming from diseased herds, or from healthy herds coming in contact, either directly or indirectly, with the disease at stock shows, fairs, etc. Unsanitary conditions seem to play a less important part in the spread of this disease than in hog cholera.

Hygienic Measures Necessary in the Treatment of Swine Plague.—The swine plague germ has less vitality than the hog cholera germ, hence it is more readily destroyed. It is largely due to this fact that the disease can be controlled. Cleaning and disinfecting the pens, hog houses, etc., and the separation of the sick from the well animals are the necessary measures in the treatment and control of this disease. In general the hygenic treatment differs but little from that recommended for hog cholera.

Serum Therapy and Vaccination.—Serums and so-called antitoxines have proven unsatisfactory in the treatment of swine plague. The same is true of vaccines.

Medicinal Treatment.—The medicinal treatment has always been along the same line as in hog cholera, and has not given satisfactory results. This line of treatment should not be permitted to draw the attention from sounder and more eco-

nomical measures. At present, we must depend on prevention and sanitary measures in combating this disease.

INFECTIOUS SORE MOUTH IN PIGS—NECROTIC STOMATITIS

Infectious sore mouth is a common disease of pigs. It usually occurs in young pigs from a few days to a few weeks old and is highly contagious. Heavy losses are frequently reported from this disease.

Causes.—The specific cause of this disease is the necrosis bacillus. This germ is widely distributed and is said to be a normal inhabitant of the hog's intestines. It is commonly found in the manure around the hog houses and in filth, and is frequently associated with other ulcerative and necrotic processes than that of the mouth.

Filthy quarters is the one condition that favors the development of the disease. Damp, wet, muddy yards are favorable conditions for the spreading of the infection, but infection may occur quite readily in dusty yards. Under such conditions the teats of the mother become soiled with filth containing the germs of the disease. A common method of spreading the disease is by affected pigs nursing and infecting the teats of mothers having healthy litters.

The germ does not develop on a healthy mucous membrane. Opportunity for developing in the mouth of the pig is afforded by some slight

wound on the lining membrane, or the inflammation and irritation to the part caused by the eruption of the teeth. Age is an important predisposing factor, as the disease is usually seen in pigs under two months of age.

Symptoms.—At the beginning of the disease, pigs that are nursing the mother are careless of the teat and may refuse to nurse. Older animals show a falling off in the appetite and eat sparingly. The animal is feverish and acts dull. On examining the mouth at this time, the lining membrane shows several inflamed patches, usually on the gum and lips. In the early stages the inflamed parts are a deep red color and swollen. Sometimes the snout and lips are badly swollen and the breathing is interfered with. Later the inflamed patches become necrotic and ulcers form. In this stage the part becomes whitish or yellowish white in color toward the central part of the area, and inflamed and thickened at the margins. The necrotic tissue soon sloughs off and deep, cavernous depressions or ulcers form. These may involve several of the teeth, or a large portion of the lips and snout. The opening of the mouth causes the animal a great deal of pain and the breath has a disagreeable odor. Salivation is sometimes noticed.

As the pig is weak, feverish and unable to suckle, it soon becomes greatly emaciated. It is usually seen standing or lying down in the pen, or in some quiet place. It moves about but little

and acts dull and stupid. The latter symptoms are due to the poisonous products manufactured by the germs, and the effect they have on the nervous system, as well as the weakened, debilitated condition.

The disease usually terminates in from three to ten days. The loss in the herd is frequently fifty per cent., and, if the conditions favor the development of the disease, it is even more fatal. Cases that make a recovery are generally stunted, or deformed about the face and lips.

Treatment.—Preventive measures are very important. They should be carried out along two lines: (1) keeping the hog house and yards in a sanitary condition by removing the manure and other filth, and the occasional disinfection of the hog house; (2) not allowing an infected pig to mix with the herd.

As soon as the disease breaks out in a litter, both the mother and the pigs should be separated from the herd. The affected pigs can be treated by dipping them head foremost into a four per cent. water solution of some reliable tar disinfectant, or permanginate of potassium, one ounce to a gallon of water, can be used. A more thorough way to treat them is to wash out the mouth by injecting the solution directly into it with a syringe. It is advisable to use this method wherever practical, and especially in advanced cases. It is also advisable to clean the ulcerated parts by scraping away the dead tissue and rubbing the

surface of the ulcer with lunar caustic. The above treatment should be repeated twice a day in advanced cases, and in mild ones once a day. It should be kept up for as long a time as necessary. A small teaspoonful of flowers of sulphur, dropped into the mouth of the affected pig, is recommended as a treatment for this disease.

It is usually more economical to kill the badly diseased pigs than it is to treat them, as they are apt to scatter the disease and become badly stunted or deformed.

TUBERCULOSIS

The abattoir statistics published by the Bureau of Animal Industry show that tuberculosis is a fairly common disease of swine, and it is no doubt on the increase in this country, especially in dairy sections, where the skim milk from the dairy is fed to hogs. Statistics show that tuberculosis in hogs varies according to the prevalence of the disease among cattle, showing that the milk from tubercular cows is the common source of this affection. It is not so prevalent in the United States as in some European countries.

In the abattoir generalized tuberculosis is more commonly found in fat, heavy hogs than in light ones. In most cases they appear to be in perfect health, and it is on post mortem examination that the diseased condition of the body is recognized. This is one of the peculiarities of the disease, and it is because of the slow progress and the absence

in most cases of noticeable symptoms that so little attention is given it.

Causes.—The specific cause is bacillus tuberculosis, which was first described by Koch in 1882. The bacilli occur in the form of slender rods having rounded ends singly, in pairs, or in small bundles. They are found in the nodules and tubercles, which they produce in the tissues. There is, perhaps, no disease producing germ that undergoes greater modifications in form and character under various conditions and environments. Even in the same animal, it may take on different forms. There is a wide variation in the types of the germ. It does not form spores, but vacuoles.

The most important factor in the production of tuberculosis in hogs is the presence of the disease among dairy cattle. The milk from a single tubercular herd, when taken to the creamery, may infect a large number of hogs in the neighborhood through the skim-milk, buttermilk, and slops. The percentage of tubercular hogs is greater in places where dairying is an important industry than in other sections of the country, a condition that proves beyond a doubt the above method of infection. A common source of the disease in young pigs, is through the milk of a tubercular mother.

The feeding of offal to hogs, as is frequently the practice at the country slaughter-house, will cause the disease, because of the germs of tuberculosis sometimes present in the carcasses, or

portions of the carcasses, eaten by the animals. Infection may also occur through the inspired air, and when hogs affected with tuberculosis are introduced into the herd, all the hogs in the pen may contract the disease.

Such conditions as act unfavorably on the constitution of the pig will, if the germs are present, favor the development of the disease. Close pens, filth, unnatural bringing up, early forcing, etc., all favor its development. Improved breeds of swine are said to contract tuberculosis more readily than the common breeds. Infection has been known to occur by way of wounds, especially castration.

Symptoms.—In pigs that have become diseased by sucking a tubercular mother, marked symptoms of intestinal and generalized tuberculosis may be manifested. The pig becomes stunted, "pot bellied," and very thin. The skin and coat present a very unthrifty appearance, and the skin is usually dirty looking and covered with crusts. Digestive disorders, such as diarrhœa, bloating, and vomiting, occur. At times the pig is feverish, refuses to eat, and finally becomes very weak. Pressure on the abdomen may cause the animal pain, and, sometimes, hard, knotty masses representing bunches of tubercles are felt.

In case the lungs are involved, the animal coughs and the breathing may be quick and labored. These symptoms become more marked as the disease progresses. In the latter stages,

the pig may have choking spells. Abnormal lung sounds are heard on auscultation.

In tuberculosis of the brain, nervous symptoms, such as turning round and round, convulsions, spasms of muscles and paralysis, occur. The head may be held obliquely, the snout drawn to one side, and the ears allowed to droop. Certain parts of the body or groups of muscles are usually involved.

The course of generalized tuberculosis is short in young pigs, but may last for months in older ones. When the disease is localized and the tissue changes in the vital organs are not advanced or extensive enough to seriously interfere with the body functions, the true nature of the disease is not recognized until after the animal is slaughtered.

Lesions.—The changes in the tissues following the invasion of the bacillis tuberculosis are the formation of nodules or tubercules, gray or yellowish white in color, or translucent in character. In some cases the nodules are distinct and easily recognized, but in advanced cases they often come together and form a mass of tubercular tissue.

In the beginning the tubercle consists of a few cells surrounding the invading germs. These are soon enclosed in a zone of epitheloid and giant cells, which in turn become surrounded by a layer of lymphoid cells. The central portion of the tubercle soon dies and breaks down, and as the nodule enlarges, the necrotic portion gradually

increases. When cut into, the diseased tissue is usually yellowish and cheesy in character. Sometimes, it is indurated and almost as hard as cartilage. Calcareous degeneration of the nodules is not often seen in hogs, as the lesions are seldom of long enough standing for this degenerative change to occur.

As the disease is nearly always contracted by the ingestion of infected food, the digestive apparatus and lymphatic glands (pharyngeal and submaxillary) are commonly involved. The lymphatic glands become enlarged, knotty, and hard. When cut open, they are made up largely of old, fibrous tissue, with yellowish, caseous centers scattered through it. Ulcers and small nodules may be found in the intestinal walls and scattered through the liver tissue, or larger nodules, varying in size from that of a pea to a hazel nut, tough and yellowish white in color, may occur. The peritoneum is sometimes the seat of fine granulations and lesions of the same nature, as mentioned as existing in the liver, may be found in the lungs, spleen, and other interal organs. In generalized cases the muscles are sometimes affected.

Treatment.—The only successful method of combatting the disease is along the line of prevention. The hogs should be kept in as healthy a condition as possible by giving them proper care, feed, and surroundings. Muddy, filthy pens are favorable for infection, and well-drained pens, clean troughs,

feeding floors, and sleeping quarters are unfavorable. Crowded quarters are also favorable for the production of the disease. All possible precautions against infection through the food supply should be taken. Feeding hogs on the offal from the slaughter-house and the carcasses of other animals is especially harmful, and should not be practiced. The feeding of skim milk and slops from a dairy, known to have tuberculosis is a very dangerous practice, and is sure to bring about a diseased condition of the herd. In cows, the disease can be recognized by means of the tuberculin test, and the affected animals can then be destroyed. In this way a healthy herd of dairy cattle can then be established, and all danger of contracting tuberculosis from this source, at least, is avoided.

Hogs known to have tuberculosis should be destroyed, and their carcasses disposed of in a suitable manner. If the herd is known to be infected with this disease to any great extent, it should be disposed of and a new herd started with animals known to be healthy. It is also best to build new yards, as it is impossible to clean up the former quarters and eliminate all danger of reinfection from this source.

RABIES—HYDROPHOBIA

Rabies is one of the oldest known infectious diseases. Hogs do not suffer as extensively from it as do horses, cattle, and dogs, but wherever

an extensive outbreak of rabies occurs, hogs as well as other animals are reported as dying of the disease.

Rabies is a very widespread disease. It is very common in most European countries, and is known to exist in nearly every part of the United States. Australia is the only country in which the disease, as far as known, does not exist. England is said to be comparatively free from it. The freedom from the disease in the latter countries is due to the control that the authorities have over the disease, by the rigid enforcement of the quarantine regulations against dogs (Australia), and the enforcement of the proper regulations against dogs running at large. The disease is no doubt on the increase in this country.

Causes.—Rabies is caused by a specific microorganism that is known to exist in the brain, spinal cord, and saliva of the affected animal. So far, investigators have not been able to isolate and study the specific factor, but its presence in the above tissues is an accepted fact.

The disease is spread by inoculation, usually by the bite of a rabid dog. Wild, as well as domesticated carnivorous animals, when rabid, may spread the disease by biting other animals. It is claimed by some that the specific factor of rabies is not present in the saliva of animals other than the carnivorous. At least, it is true that they are prone to bite and have a good opportunity to attack people and farm animals when affected, hence

dogs must be considered the principal factor in the spread of the disease. Some writers state that the bite of a rabid hog may produce the disease.

In hogs a large per cent. of the animals bitten develop the disease. The average period of incubation is from two to three weeks.

Symptoms.—Rabies in swine is characterized by very much the same train of symptoms as develop in other animals. Two forms of rabies, the furious and dumb, occur. The furious is the more common in hogs. The animal is very restless and excited. If lying down in the litter, it may jump up suddenly, squeal and run about as if pursued. Sometimes, it backs up into a corner of the pen. The animal is very nervous and easily startled. If a person enters the pen, it will run at him. The eyes are at times fixed, or are rolled about, and there is an abundant secretion of saliva which dribbles from his mouth. Frequently it will gnaw the boards around the pen, make desperate efforts to get out, swallow indigestible objects, and attempt to bite other animals. Paralysis soon comes on, the hog has difficulty in swallowing and is unable to move about.

The duration of the disease is short. Paralysis comes on early in the attack, and the animal is seen lying or hiding in the litter and pays no attensian to its surroundings. It does not become excited when approached, is very weak, and dies in a few days.

Lesions.—The tissue changes are not constant

or specific. A congested condition of the mucous membrane lining the pharynx, larynx, and stomach, enlargement of the spleen, and a congested condition of the brain are sometimes present. Because of the desire to swallow indigestible objects, foreign objects, such as stones, straw, pieces of wood, etc., are frequently found in the stomach.

The most constant lesions are microscopic in character. These are present in the nerve tissue, especially in the gray matter surounding the cerebro-spinal canal, and consist of a hyperemia, pigmentation, proliferation, and degeneration of the cellular structure.

Treatment.—The treatment of hogs in any way is not practical. As soon as the animal develops rabies it should be destroyed, or isolated, in order to prevent any possible spread of the disease to the other animals in the pen. Stray dogs should be regarded with suspicion and not allowed to loiter around the premises, or taken care of in the proper manner, as it is the rabid dog, not manifesting marked symptoms of disease, and allowed to stay around the premises and mix with the stock, that is the most dangerous.

INFECTIOUS ARTHRITIS

Inflammation of the joints is a disease of young pigs from a few days to a few weeks old. It is caused by germs entering the body by way of the naval cord. Other tissues of the body besides the joints may be involved.

Causes.—Filthy breeding pens can be considered the primary cause. In such surroundings there is danger of the umbilical cord becoming infected with the proper disease producing germs, as it is moist and soon becomes soiled and covered with filth. When the pigs once have the disease, it usually recurs in the successive crops of pigs, unless the pens are cleaned and disinfected. Sometimes it spreads to other herds in the neighborhood and causes heavy losses.

Symptoms.—The affected joints are swollen and painful. Abscesses may form in different parts of the body, usually about the naval opening. In case the abscess at the umbilical opening is large, it may discharge its contents into the abdominal cavity, and cause the death of the animal. It is not uncommon, however, for it to break on the outside. Sometimes, abscesses form in the joints and break. In severe cases the intestines and other internal organs are affected and the pig is constipated, or has a diarrhœa.

In mild cases the pig is lame and weak, but continues to suckle the mother. After a time it will become stunted, unless cared for, and may finally die. If the intestines are involved and the joints badly inflamed, the appetite is lost and the pig is feverish and weak. Death generally follows within a few days.

Treatment.—This is largely preventive. The breeding pens should be clean, dry, and well lighted. If the disease exists in the herd, the pens

should be thoroughly disinfected and all litter removed to a place where the hogs do not come in contact with it. In addition, the sows should not be permitted to farrow close to an affected litter, or in a pen where an affected litter has been kept.

The pigs can be treated by washing the umbilical cord with a strong solution of carbolic acid (ten per cent. or more), or some of the tar disinfectants. If the disease is present in the herd, this should be practiced as soon as the pigs are born. Such treatment causes the cord to dry up, and the entrance of germs into the tissues is prevented. The diarrhœa and abscesses should receive the proper treatment.

SIMPLE SEPTICÆMIA AND PYÆMIA

There is no essential difference between septicæmia and pyæmia, and writers classify all blood poisoning as a septicæmia, as the immediate cause of the diseased changes in the tissues are due to the action of the toxic substances, produced by the invading microorganisms.

The difference in the symptoms and diseased changes in the tissues occurring in blood poisoning is due to the extent in which the tissues are invaded, and the nature of the disease-producing agent. The germs sometimes enter the system by way of a wound and are distributed throughout the body by the blood. In case of pyogenic bacteria, abscesses form in different parts

of the body. This is the most common form of blood poisoning in swine. Local abscesses are not uncommon. At other times the germs do not overrun the tissues, but remain at the wound or point of inoculation. Here they develop and produce toxic or poisonous substances that may exert a local or general poisonous effect on the tissues of the body. This may produce profound general shock to the system, or inflammation of certain organs. Several different forms of bacteria may be present in this disease.

Causes.—The forms usually encountered are micrococci, especially staphylococcus albus and aureus, streptococci, and a few bacilli. These germs enter the tissues through bruises or abrasions in the skin, and extensive wounds. The opportunity hogs have to become infected through their surroundings is of great importance, and is responsible for the abscesses occurring in this class of farm animals. Infection sometimes follows castration, or other operations, when carelessly performed and not cared for properly. Blood poisoning is not rare as a result of putrifactive changes in the womb following an inflammation of the organ, or as a result of retention of the fœtus.

Symptoms.—Unless the symptoms follow an extensive infection resulting from a difficult birth, an operation, or a large wound, the symptoms are not connected with a disease of this nature. When the infection occurs through a bruise or a

slight abrasion in the skin, the part becomes inflamed, swollen, or œdematous. An abscess may also form. In case an open wound is infected, it may become badly swollen, the granulations, red and unhealthy in appearance, and pus and other secretions collect on its surface.

The body temperature may be elevated and the appetite impaired. Muscular tremors are sometimes noticed and the hog is dull and stupid. In serious cases of the disease, the animal lies around in the pens, weeds, or in some quiet, cool place. It becomes very weak and emaciated. Death occurs in a short time. However, in most cases of general blood poisoning recovery occurs, and the hog soon improves in condition.

Treatment.—The treatment is mostly preventive and consists in giving wounds the proper attention, especially if extensive. Antiseptic precautions should be observed, as recommended in all operations. Abscesses should be opened as soon as formed, and at the lowest point, in order to permit proper drainage. The after treatment consists in washing the part with a two per cent. water solution of some reliable disinfectant, once a day for a short time. The opening should not be permitted to close until the cavity has filled in. Large wounds should be attended to carefully and kept clean by washing them with a disinfectant wash and dusting the surface with powdered disinfectants (boric acid, calomel, etc.). All dead tissue in the wound must be removed.

In local blood poisoning, the above treatment is all that is necessary. In case the disease is generalized, internal treatment should be given. Alcohol, salicylate of soda, and quinine are the drugs generally given. Plenty of clean drinking-water should be allowed. The animal should be given a comfortable pen and coaxed to eat easily digested and nutritious food, in order to help in keeping up its strength.

PART IV

PARASITIC DISEASES

THE HOG LOUSE

Hæmatopinus suis—Linnæus

THE hog louse is the only common external parasite of swine. As well as the largest, it is the most common louse found on domestic animals, and because of its size and the thinness of the hog's coat, can be readily seen. It is generally found on the thin parts of the skin (back of the ears, on the inside of the thighs, etc.) that are more easily penetrated by the mouth parts of the parasite. Unthrifty pigs and adults may become badly infested, but on thrifty, active animals the invasion is not as great because of their ability to resist it. Lice are seldom found on hogs that have been shipped some distance, especially during the warm weather. The coat affords the lice but little protection, and they become dislodged when hogs are crowded together and sprinkled with water.

Description.—The hog louse is a blood-sucking parasite and the largest species of the family. The female, when grown, is fully one-fourth of an inch long, but the male is smaller. The latter is also distinguished by a dark streak on the middle and ventral surface of the last three abdominal seg-

ments. The general color of the louse is gray, with the margins of the head, thorax, and abdomen dark.

The eggs are found in large numbers attached to the hair in the region of the ears, shoulders, and thighs. They are slightly yellowish or dusky white in color, somewhat oval in shape, tapering toward the point of attachment and large at the

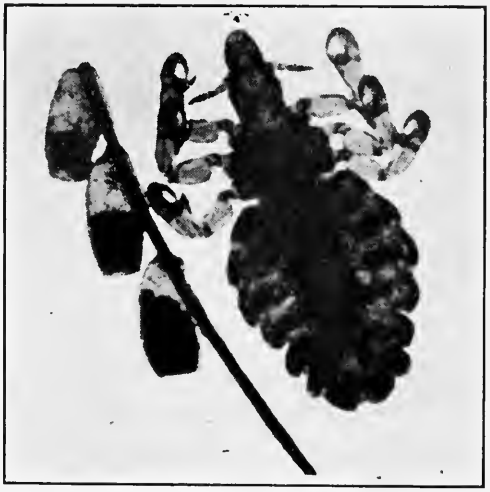


FIG. 16—A HOG LOUSE AND HAIR WITH EGGS ATTACHED

free end, the lid of which is forced open by the young louse when it is ready to leave the egg. The period of hatching is probably from one to three weeks.

Source of Infection.—This pest is widely distributed. Hogs become infested by coming in contact with lousy hogs, or when kept in pens and hog houses that have been occupied by such ani-

mals. A very common source of infestion is the buying of stock hogs from infested herds and allowing them to mix with the herd without destroying the lice and eggs that are on them. The thinness of the coat enables the animal to brush off the lice, and they become scattered around the premises and crawl onto other animals whenever the opportunity offers. The tumble-down, dirty hog houses, sheds and old straw stacks that are often used as quarters for hogs, when once infested with lice, become centers of infection, unless radical steps are taken to destroy the pest.

Injurious Results.—Whenever a large number of lice are present on a hog, they cause a great amount of irritation, and the animal becomes restless and does not feed as well as common For this reason growth and thriftiness are interfered with. Pigs suffer more than older animals. The irritation to the thin parts of the skin is sometimes quite noticeable, and some authors state that the hog louse is one cause of urticaria (rash or heat sores). However, when such a condition occurs, it is generally caused by the application of a remedy to destroy the lice.

The unthrifty condition is not as marked in strong, healthy herds as it is in diseased, poorly cared-for ones. The coat becomes thin and rubbed off, and the skin dirty and more or less covered with scales and sores. There is no positive evidence that the hog louse can convey disease-producing germs from one animal to another.

However, some writers believe that lice are important agents in the spread of hog cholera.

Treatment.—The habits of hogs, and the difficulty in destroying the lice scattered around the hog houses and yards make it a task to free a herd from lice. Those on the bodies of the hogs are easily destroyed by dipping, spraying, or sprinkling with such remedies as the tar disinfectants, kerosene emulsion, and the different preparations used for dipping sheep. But unless the necessary precautions are taken against reinfection from the surroundings, the relief is only temporary.

Two per cent. water solutions of the tar disinfectants are the best remedies for lice. They are best applied by dipping and in large herds a dipping tank is a necessity. In order to kill the young lice that have hatched from the eggs, the hogs should be dipped two or three times at intervals of about two weeks. There should be enough of the solution to cover the animal, when it jumps into the tank.

Kerosene emulsion is usually applied with a spray pump or sprinkling can. The following formula can be used: Hard soap, one pound; kerosene, two gallons, and water, four gallons. One part of the emulsion to eight parts of water can be used. Five parts of water and one of kerosene may be used if the spray pump has an attachment for mixing the oil and water. Water solutions of the tar disinfectants may be applied in the same way as

the above, but are not as effective as when used as a dip. When these methods are used, the hogs should be crowded into a small pen and kept moving about so that they will rub against one

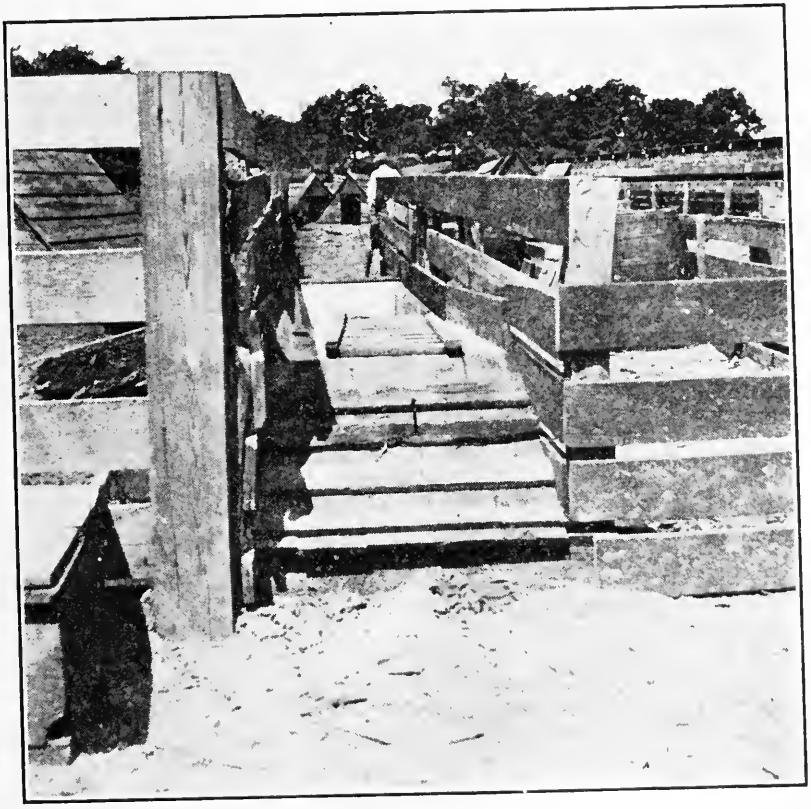
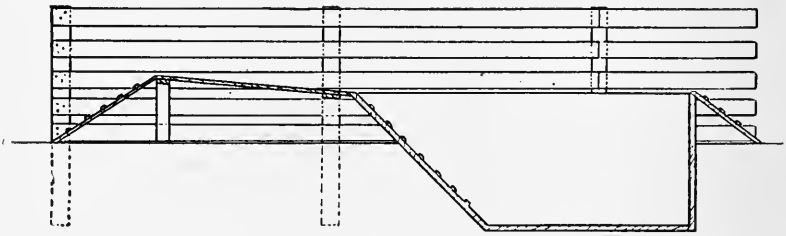


FIG. 17—DIPPING TANK

another. Kerosene remedies should not be used during the day and the pigs allowed to run in the hot sun, as there is danger of the skin becoming irritated. A better time is in the evening.

The necessary precautions against reinfection

are as follows: After dipping the hogs, they should be moved to quarters that they have not had access to for some time. This should be done



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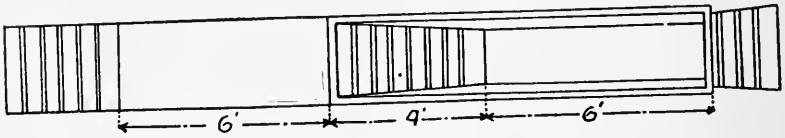
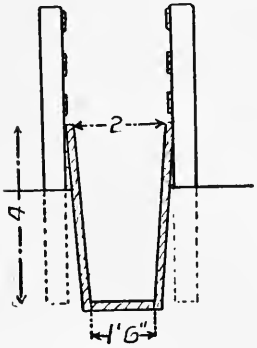


GROUND PLAN. SCALE V-F -



CROSS SECTION

SPECIFICATIONS FOR LUMBER FOR DIPPING TANK

2 — 2″ × 12″ × 16′.	Pine.
4 — 2″ × 12″ × 12′.	
2 — 1″ × 6″ × 16′.	
2 — 1″ × 6″ × 12′.	

FIG. 18—PLAN FOR GOODELL DIPPING TANK

whenever possible. The pens and hog houses can be sprayed with the same remedies recommended for destroying the lice. All litter around the hog houses and pens must be burned, or re-

moved to a place where the hogs do not have access to. Unless the yards are clean and well kept, we cannot get rid of them by destroying the lice on the hogs and paying no attention to the surroundings.

THE COMMON ROUND WORM

Ascaris Suilla—Duj.

The common round worm is a parasite of the small intestine. Occasionally a few of these worms drift along with the alimentary matter into the large intestine, but their presence here is accidental and they finally pass out with the excrement. It is not uncommon to find common round worms in the stomach of a hog that has been dead for a short time, and when a large number are present, they may pass on into the œsophagus. This is due to the reverse peristalsis of the intestines, or the movement of the worms themselves. The digestive juices in the stomach will in a short time destroy them, and they are unable to become a parasite of this part of the digestive tract. Many stockmen have erroneous ideas regarding this parasite.

Description.—The body of the common round worm is pinkish or yellowish white in color, smooth, firm, and elastic, and tapering toward the extremities, the head end being more tapering than the caudal extremity. The female, when grown, will average about eleven inches in length, and the male about seven inches. The latter can be readily dis-

tinguished from the female by its curved caudal extremity.

The ova, or eggs, are about one four-hundredths of an inch in length.

Source of Infection.—The eggs of the female be-

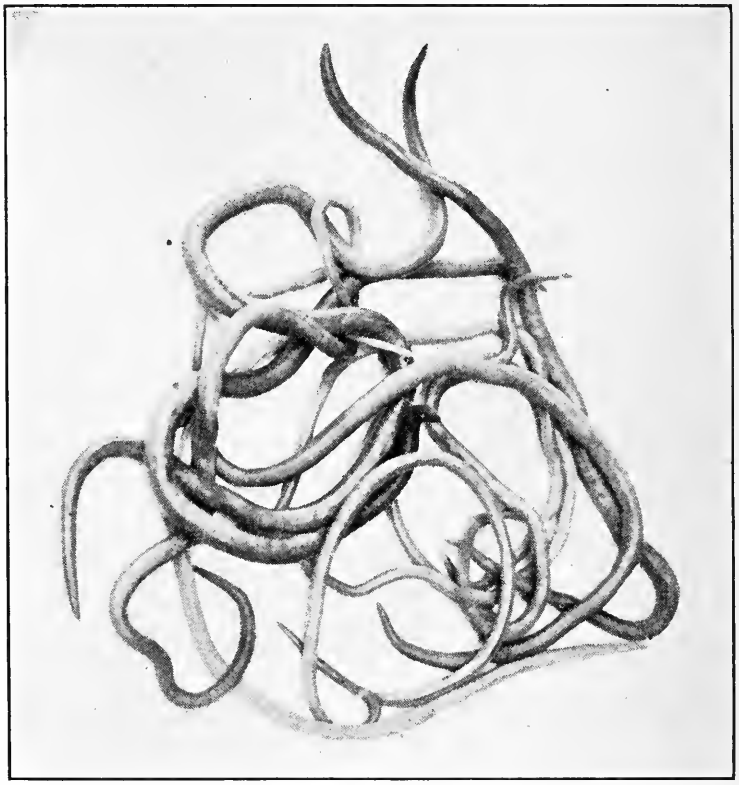


FIG. 19—COMMON ROUND WORMS

come mixed with the alimentary matter and pass out of the intestines with the excrement, and become scattered over the pens and pastures. Infection occurs by taking the eggs containing well-developed

embryonic worms into the digestive tract along with the food. Such conditions as favor the contamination of the food with the embryos, especially the drinking-water, are the main predisposing causes. Young and unthrifty hogs, because of their condition, are predisposed to intestinal worms. Feeding hogs on dirty feeding floors, or on the ground, and drinking from ponds and dirty watering troughs, are the common sources of infection.

FIG. 20—ROUND WORMS IN A PIECE OF INTESTINE

Symptoms.—The symptoms are not characteristic enough to enable us to diagnose this particular form of intestinal parasitism, unless the worms are present in the feces. The character of the symptoms depend on the extent of the invasion. When only a few forms are present, but little disturbance in the thriftiness of the animal is noted. But large numbers cause the lining membrane of the intestine to

become irritated and inflamed, and obstruct the passage of the food along the canal. The resulting symptoms are those of acute or chronic indigestion, and in young and poorly cared-for animals the diseased condition is marked. Pigs are sometimes very restless because of the irritation to the intestines, and may show other symptoms of a nervous character.

With proper care and feeding, pigs become strong and healthy enough to throw off the parasites. In thrifty hogs round worms are not found in large numbers and cause no apparent harm to their host.

THE THORN-HEADED WORM

Echinorhynchus Gigas—Goeze

Hogs are the only domestic animals that act as hosts for the thorn-headed worm. The species found in hogs, in the adult stage, is a parasite of the small intestine, sometimes of the large, and is usually found fixed to the intestinal wall by means of its hooked proboscis, from which the name thorn-headed is derived. This parasite is not as common as the round worm, and it is unusual to find more than five or six of them in the intestines of any one animal. It is frequently found associated with the former, but is easily distinguished from it. However, the loss caused by it is no doubt large.

Description.—The thorn-headed worm is milky white in color, irregularly wrinkled transversely, and gradually tapering to a blunt point at the posterior extremity. The general shape of the body

is cylindrical, with the greatest diameter toward the anterior part. At the anterior extremity is a retractile proboscis armed with six rows of hooks, by means of which it attaches itself to the intestinal wall.

The average length of the female is about eleven inches; that of the male, from two and a half to three inches.

The eggs average about one two-hundred-and-

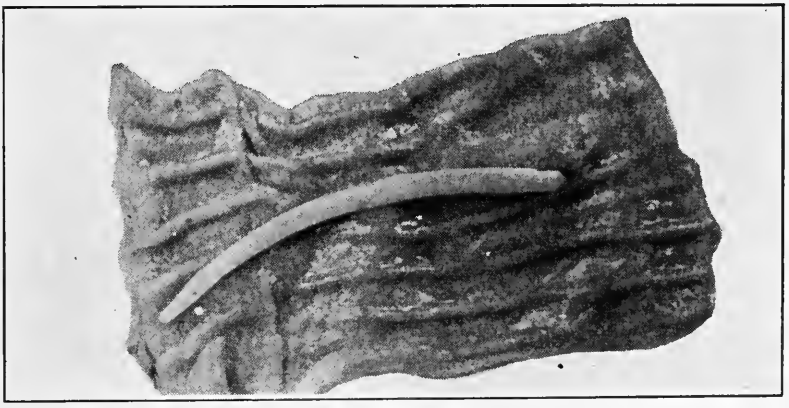


FIG. 21—MALE THORN-HEADED WORM ATTACHED TO WALL OF INTESTINE

fiftieth of an inch in length, and are smooth and somewhat cylindrical in shape.

Source of Infection.—The development of the thorn-headed worm requires an intermediate host, the larvæ of the May beetle, or some other invertebrate form, in which they encyst. The female deposits her eggs in the hog's intestines, and they pass out along with the excrement. In this way

they accumulate in manure heaps, and become scattered over the hog lots and pastures. The eggs or ova containing embryonic worms are eaten by white grubs, in which they encyst. The white grubs are in turn eaten by the hog, the larvæ of the thorn-headed worm are liberated by the digestive juices, and become a parasite of the small intestine, where they develop into mature parasites.

It is necessary, then, for the hog to eat a white grub, possibly some other invertebrate, that is infected with the larval form of the parasite before it can become infected. Hence it is in old hog lots and pastures, around manure heaps and in clover fields where grubs are plentiful, that hogs suffer most from thorn-headed worms.

Symptoms.—The worm is usually found with its head end buried more or less deeply in the walls of the intestine. The irritation to the tissues at the point of attachment is severe, and, when a number of worms are present, the intestines appear badly irritated. It may not remain in one place, but drift to different parts. The former places of attachment, if recent, are marked by local areas of inflamed tissue. These red, thickened, hard areas are usually about a quarter of an inch or more across, and have a central depression, which marks the point where the hooked head was imbedded. The entire thickness of the intestinal wall may be involved.

Some writers state that perforation of the intestine sometimes occur. We should doubt the truth of this statement. Whenever a hog's in-

testines are badly irritated and inflamed by either the common round or thorn-headed worm, they tear easily when handled, because of the inflammatory changes. The worms may drop through the torn part into the abdominal cavity, and the break in the wall is mistaken for a perforation. Stockmen frequently describe such post mortem lesions in hogs.

The disturbance in nutrition and the class of symptoms shown by the hog depend on the number of worms present. In most cases the animal does not harbor more than three or four, and these are often associated with other forms, generally common round worms. Badly infected pigs are said to show an irregular appetite, constipation, diarrhœa, severe pain, and marked unthriftiness. Most writers consider the nervous symptoms of most importance. However, the symptoms shown do not differ greatly from those resulting from the presence of round worms.

THE PIN WORM

Œsophagostoma Dentatum—Rud.

The pin worm is a very common parasite in hogs. It is usually found in large numbers toward the beginning of the large intestine (cæcum and double colon), mixed with the intestinal contents and between the folds of the lining membrane. It is a small worm, and unless looked for carefully escapes notice.

Description.—The body of the pin worm is white or grayish brown in color, straight and pointed at

both extremities. The average length is about half an inch. The female is larger than the male.

Source of Infection.—This species of intestinal worm is very widely distributed. Infection and reproduction occur the same as in other round worms. The large is a more favorable location for parasites than the small intestine, as they are situated so far back that it is difficult to destroy them, and a healthy digestion does not disturb their development to the same extent that it does in the small intestine.

Symptoms.—It is generally understood that pin worms interfere but very little with the thriftiness of their host. The worm is small, and its location and habits are not what we expect in one causing marked disturbance. Although often present in large numbers, the irritation to the intestines is not sufficient to cause a noticeable inflammation of the lining membrane. It does not seem to cause as much annoyance and restlessness as do the pin worms in other species of animals.

Little is known regarding the symptoms of disease produced by the pin worm of hogs. But no doubt in conjunction with other parasites it helps in aggravating the symptoms of intestinal parasitic diseases.

THE WHIP WORM

Trichocephalus Crenatus—Rud.

The whip worm is the least common of the intestinal worms of hogs. It is usually found in the beginning of the large intestine (cæcum), with its head end firmly attached to the lining membrane.

Description.—The whip worm is about one and a half inches long. The anterior two-thirds of the body is very thin and hair-like, and the posterior third is suddenly expanded, thick and cylindrical in shape. It is because of its resembling a whip in shape that it is popularly known as whip worm. The male is

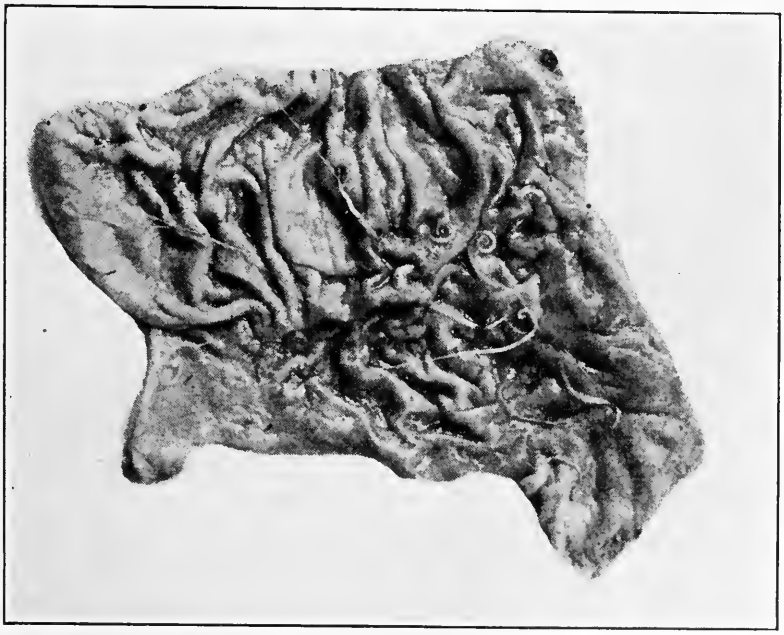


FIG. 22—WHIP WORMS ATTACHED TO WALL OF INTESTINE

smaller than the female, but the difference in size is not as noticeable as in other forms. The male can be easily recognized by its coiled caudal extremity.

Source of Infection.—Infection occurs in the usual manner. The ova, or eggs, become scattered about the pens and pastures, and are taken into the

digestive tract along with the food, usually the drinking-water. Four weeks after reaching the intestines, eggs that contain well-developed embryos are said to develop into mature worms.

Symptoms.—The whip worm seems to cause but little disturbance, even when present in large numbers. It no doubt irritates the lining membrane of the cæcum, but irritation such as produced by this parasite does not interfere with the digestion of food to a noticeable degree. When present along with other forms, it no doubt helps in producing symptoms of parasitism.

THE TREATMENT OF INTESTINAL WORMS

Preventive Treatment.—The animal parasites that are the most common are those having a simple life history. When an intermediate host is required, as is the case with the thorn-headed worm, tapeworms, and flukes, there is a better opportunity to destroy them, and a very small per cent. of the eggs and larvæ develop into mature worms. In all forms, however favorable the surroundings and simple the life history, a large per cent. of the eggs perish. But when the conditions are favorable, the eggs and larvæ are able to survive for a longer time and have a better chance to infect animals and reach maturity.

Stagnant ponds formed by surface water and in which hogs wallow are favorable places for the lower forms of animal life to incubate and develop. For this reason old pens and pastures, if wet, should

not be used for hogs. The pastures and pens should be well drained and all ponds filled in. More attention should be given the methods used in feeding hogs. Feeding in muddy yards that have been in use for years and on feeding floors that are not kept clean, should not be practised. The drinking-water should come from a deep well, and we should try to keep it pure by using clean troughs in which the hogs cannot wallow and fill with filth.

In young hogs the feeding of a ration that will meet the needs of the system and keep them in a healthy condition, is an important preventive measure. Because of the healthy, active condition of the intestines and other organs as well, the parasites are unable to live and multiply, and most of them perish and are thrown off. In the average herd, freedom from this class of disease does not depend so much on the surroundings, but on the vigor of the hogs themselves.

In order to prevent infection from thorn-headed worms, hogs should not be allowed to run around old straw stacks and manure heaps, or in places where white grubs are common. Old hog lots and pastures can be largely freed from grubs by plowing and sowing them to some forage crop.

Medicinal Treatment.—The average herd of pigs is kept under such conditions that it is necessary to dose them at least once during the year with some remedy that will destroy the worms, or drive them out of the intestines. Drugs belonging to this class are called vermicides and vermifuges.

Some of the "hog cholera remedies" contain these drugs, and swine breeders sometimes use these preparations as remedies for intestinal worms.

Turpentine, santonin and calomel are the drugs most used for destroying intestinal worms. In treating hogs, the best and easiest method of giving the remedy is in the feed. It is best to divide the herd into small bunches of five or ten, and dose each bunch separately. If this is not practiced, all will not receive the proper dose. Powdered preparations like santonin and calomel, that are insoluble, should be mixed with ground feed and fed in a trough. Drugs like turpentine and gasoline, that form an emulsion with milk, are best given in this manner.

Turpentine is a cheap and convenient remedy, especially for the thorn-headed worm. The dose is one teaspoonful for every eighty, or one hundred pounds live weight. A very good time to administer it is in the morning after the pigs have been starved for at least twelve hours. Withholding all food for a short time before giving the remedy should be practiced. The dose of turpentine should be repeated daily until three doses are given.

Stockmen will find santonin and calomel very effective remedies for intestinal worms. Five grains of calomel, and eight grains of santonin may be given for every hundred pounds live weight. The two drugs should be put up in powders large enough for the bunch of five or ten pigs, and fed in ground feed. A mixture of areca nut and worm

seed in teaspoonful doses is also recommended. In special cases it is well to follow the above with a physic.

THE KIDNEY WORM

Sclerostoma Pinguicola—Verrill

Stockmen are better acquainted with the intestinal worms than they are with the kidney worm. As its name indicates, it is a parasite of the kidneys and the fat surrounding them. The kidney worm is not as common as the intestinal forms, and is not found in such large numbers. Its home is in cysts and canals excavated in the tissues, and generally two or more worms are present in the one cyst, together with a large number of eggs.

Description.—The body is cylindrical in shape and tapering toward the extremities, dark in color and quite mottled. The female is from an inch and a half to two inches in length, and the tail is curved with a conical-shaped tip. The male is from an inch to an inch and a half in length, and the posterior extremity forms a blunt point. The mouth in either sex is circular.

The eggs are oval-shaped and about one two-hundred-and-fiftieth of an inch in length.

Source of Infection.—The method of infection, or the life history of the kidney worm, has never been worked out, but no doubt infection occurs direct from one hog to another without an intermediate host. Some of the canals and cysts occupied by the worms open into the pelvis of the kidney. The eggs deposited in these cysts become mixed with the

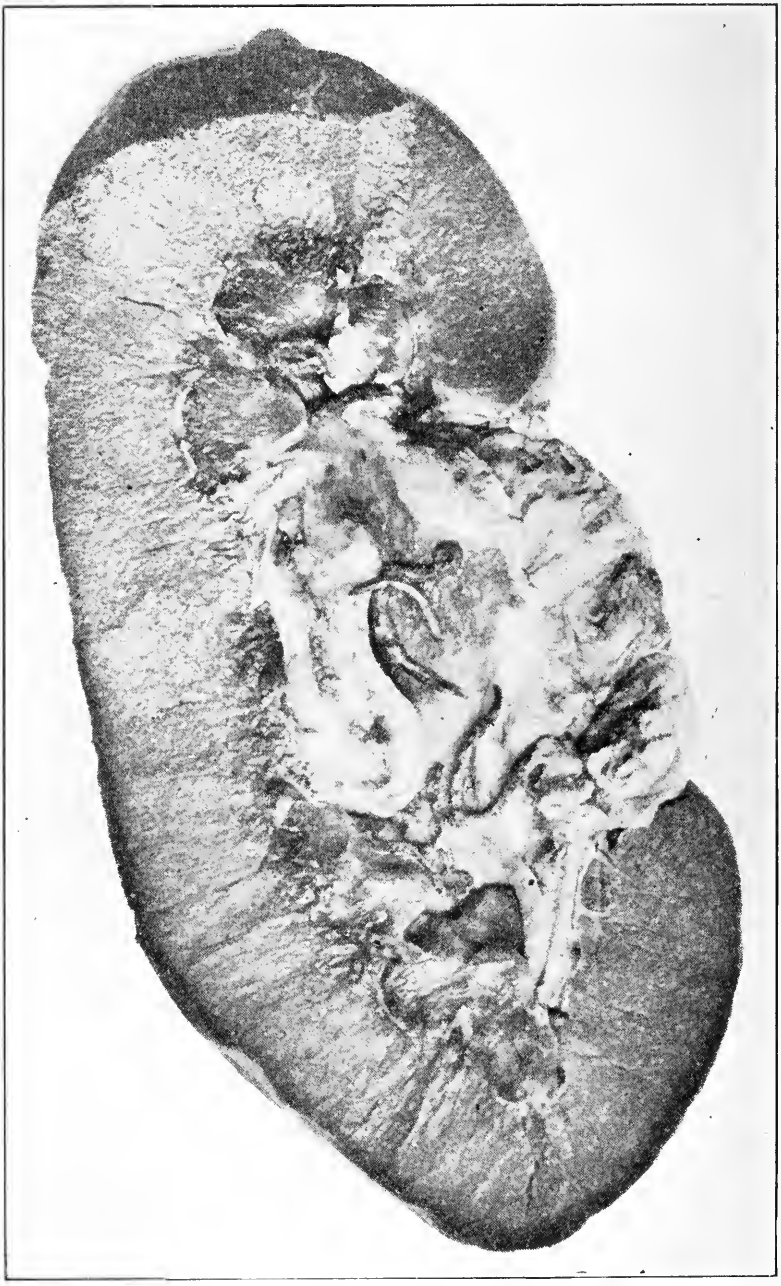


FIG. 23—SECTION OF HOG'S KIDNEY SHOWING KIDNEY WORMS

urine and pass out with it. Moist surroundings seem to be necessary for the development of the embryos. The probable method of infection is through the food supply. The well-developed embryos reach the intestines along with the food, and finally pass from here to the region of the kidneys, where they find the conditions favorable for development.

Symptoms.—The kidney worm does not produce characteristic symptoms of disease, and we are unable to diagnose its presence in the living animal, unless it is possible to find the eggs of the parasite on making an examination of the urine. Some swine breeders believe that a weak back and paralysis of the hind parts are symptoms of this disease, and a few years ago the kidney worm was claimed by some to cause hog cholera. There is nothing to prove the above statements, and the presence of the worm under such conditions is only a coincidence. Paralysis in hogs is not produced by this parasite, as has been proven by numerous post mortem examinations.

The irritation to the walls of the pelvis and ureter is sometimes sufficient to cause an inflammation of the parts, but in hogs so diseased, no noticeable symptoms of kidney trouble develop. The tissue in the region of the cysts and canals is replaced largely by inflammatory tissue. Small pus centers are often noted. Large abscesses may also occur, but the latter lesion is quite common when no kidney worms are present.

Treatment.—Preventive treatment is the only successful method of combating the kidney worm. This is along the same lines as recommended for intestinal worms. The turpentine treatment may be of some benefit, as it is partially eliminated from the body by the kidneys. However, it is hardly probable that such treatment as this would prove at all effective, even if a correct diagnosis was made.

THE LUNG WORM

Strongylus Paradoxus—Mehlis

The lung worm of hogs is of greater economic importance than is commonly believed. It is the most common parasite of swine, and when the conditions are favorable for its development, may be present in the air passages in large numbers and seriously interfere with the thriftiness of the pigs. It is usually found in the small bronchial tubes mixed with the mucus, which is secreted in abundance by the irritated lining membrane. If the infection is light, the parasite is generally overlooked. In such cases if a piece of the lung is cut off at the apex, and the tissue pressed between the fingers, the worms present in the bronchi are forced out and onto the cut surface.

Description.—The lung worm has a thread-like body, varying in length from three-quarters of an inch to an inch and a half, and white or brownish in color. The male is smaller than the female and the tail is curved.

Source of Infection.—The complete life history

of the lung worm of hogs is not known. The mature worms, which are present in the bronchi, produce a large number of eggs and embryos. These, and sometimes the adult worms, are coughed up with the mucus and become scattered about the pens and pastures. Moist surroundings are favorable for the development of the embryos, but such conditions do not seem to be necessary for their development. Pigs kept in dry lots and well cared for frequently become infected, but wet surroundings are more favorable for infection, and under such conditions this class of disease may take on a severe form.

Lung worm diseases cannot be produced in animals by feeding them the mucus from the air passages of diseased individuals. The only avenue of infection is seemingly the air passages. It has been shown that after the embryos have undergone development in moist earth, they stand drying for a short time, and when placed in moist surroundings will again assume their activity. It seems possible, then, for infection to occur as a result of inhaling dust containing embryos. This is possible because of the habit hogs have of wallowing in the mud and coating themselves with dirt, which soon dries and is brushed off in the hog houses and pens, and helps to make their quarters dusty. When this dust is inhaled, any embryonic worms contained in it will find sufficient moisture in the air passages to revive them.

Symptoms and Lesions.—The disease is largely

confined to pigs, and in most cases the symptoms are so mild that the character of the ailment is not suspected. A spasmodic cough is the most prominent symptom. Sometimes, regular coughing spells come on when the animal begins moving about, after it has been lying down. Unless the infection is severe, difficult breathing does not occur, and there is no noticeable check in the growth and thriftiness of the pig. The latter symptoms are never as marked as in lung-worm diseases of calves and lambs.

In well-cared-for pigs, the appetite remains good and the pig gradually outgrows the disease. In poorly cared-for and weak individuals, the outcome is not so favorable, and they may become stunted and the disease persist for a long time. Death seldom occurs.

The lung lesions are produced by the worms irritating the lining membrane of the bronchial tubes, causing it to become inflamed and increasing the amount of mucus secretions. This mucus, together with the worms, may plug the small bronchi, prevent the air from passing to the air cells, and cause a lobular pneumonia. Healthy hogs that are slaughtered in the abattoir are frequently infested with lung worms; the lungs in such cases show but little evidence of disease.

Treatment.—This parasite is so widely distributed that it is necessary to use all measures of precaution possible in order to prevent infection. The yards should be well drained, and all ponds and mud holes

kept filled in. The sleeping quarters should be kept clean and disinfectants used freely. Other measures as recommended in the treatment of intestinal worms should also be used.

Medicinal treatment is of little value. Inhalation of tar, or turpentine fumes, may be used, but the general use of such lines of treatment is unpractical. The best and most practical method of treating lung worm diseases is good care, nourishing food and hygenic surroundings.

TRICHINOSIS

Trichinosis is a disease of the muscular tissue of the body caused by a small round worm, the Trichina Spiralis (Owen). It occurs in two forms in animals—the intestinal, which represents the adult worm or perfect stage, and the muscular, which represents the larval stage. From one to three per cent. of the pork that is inspected in this country is said to be infested with this parasite.

Source of Infection.—Hogs become affected by eating rats that are infested with the larval form. According to the investigations made by Stiles, rats around the country slaughter-houses are quite generally infested with trichina, due no doubt to the careless way of disposing of the offal at such places. Hogs also have an opportunity to feed on the offal and become infected.

Flesh containing the larval trichina, when taken into the digestive tract, is acted on by the digestive juices, and the young parasites are liberated. With-

in a few days they develop into the adult form, copulation takes place, the eggs hatch in the uterus of the female, and in about one week the embryos are born. The embryos then migrate from the intestines and finally encyst in the different parts of the body.

At first the symptoms manifested are those of some digestive disease, but later when the embryos are migrating through the tissues of the body, the symptoms are rheumatic in character.

Treatment.—In order to suppress trichinosis in hogs, it is necessary to practice proper preventive measures. The most necessary preventive precaution is to dispose of the offal at the country slaughter-house by tanking, and not allow rats and hogs to eat this refuse.

As this disease is communicable to man and may be followed by fatal results, pork should be eaten only when well cooked, or well cured. The encysted worms cannot survive the proper curing and cooking of the pork.

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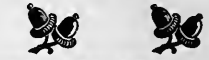

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